Chemical Industries

Including CHEMICAL SPECIALTIES

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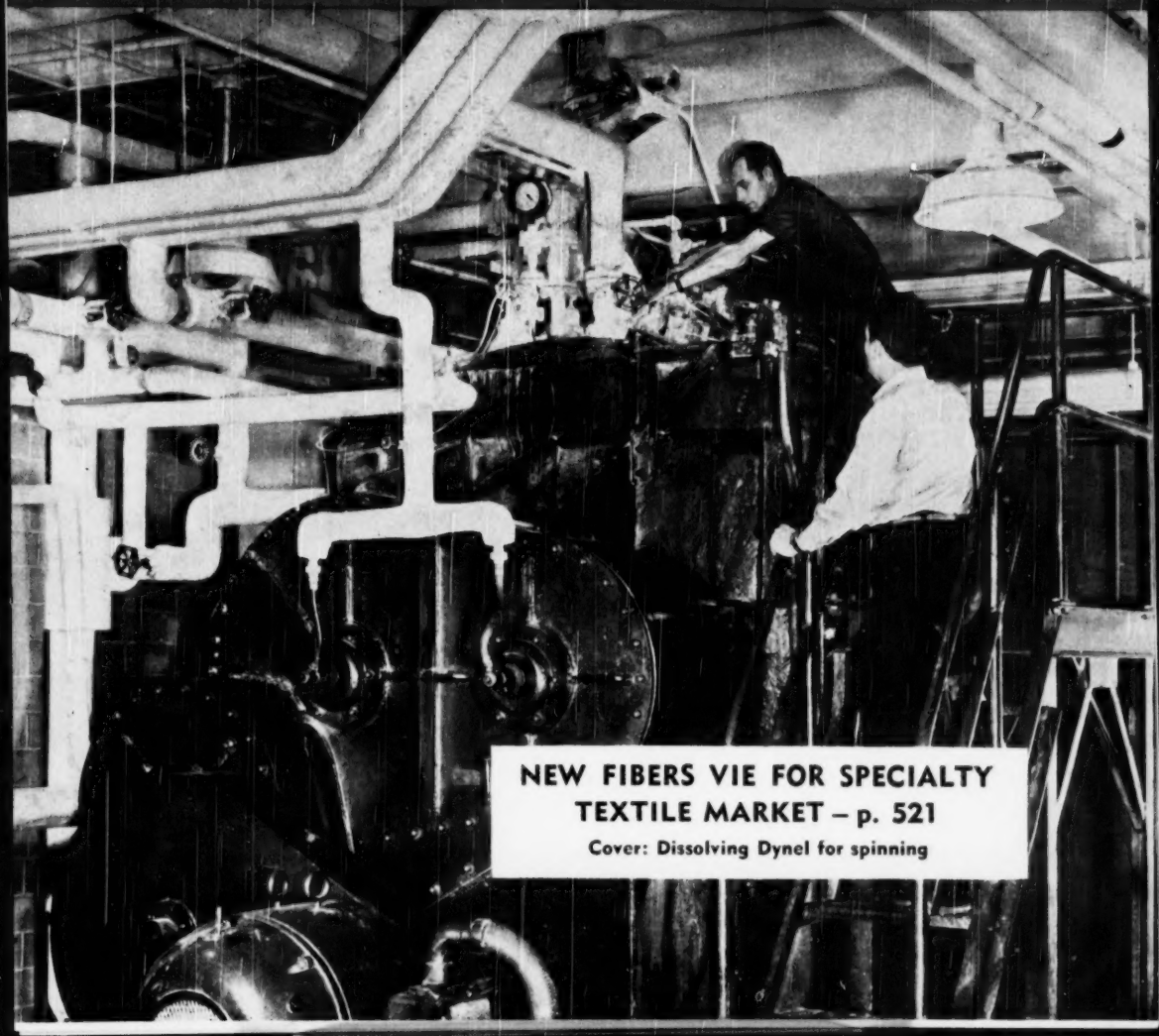

NEW FIBERS VIE FOR SPECIALTY TEXTILE MARKET – p. 521

Cover: Dissolving Dynel for spinning

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NYTRON HAS EXCEPTIONAL DETERGENCY; it is effective on an unusually wide variety of soils; it cleans efficiently in either hot or cold water and retains its detergent action when used in either acid or alkaline mediums.

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NYTRON COUNTERACTS HARD WATER difficulties; more economical because increased quantities do not have to be added to compensate for water hardness; completely prevents the formation of scum, grease rings, streaks, spots.

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NYTRON HAS HIGH AND RAPID SOLUBILITY; it goes into solution almost instantly in hot or cold water and will not "salt out" in concentrated solutions of many acids, alkalies or metallic salts.

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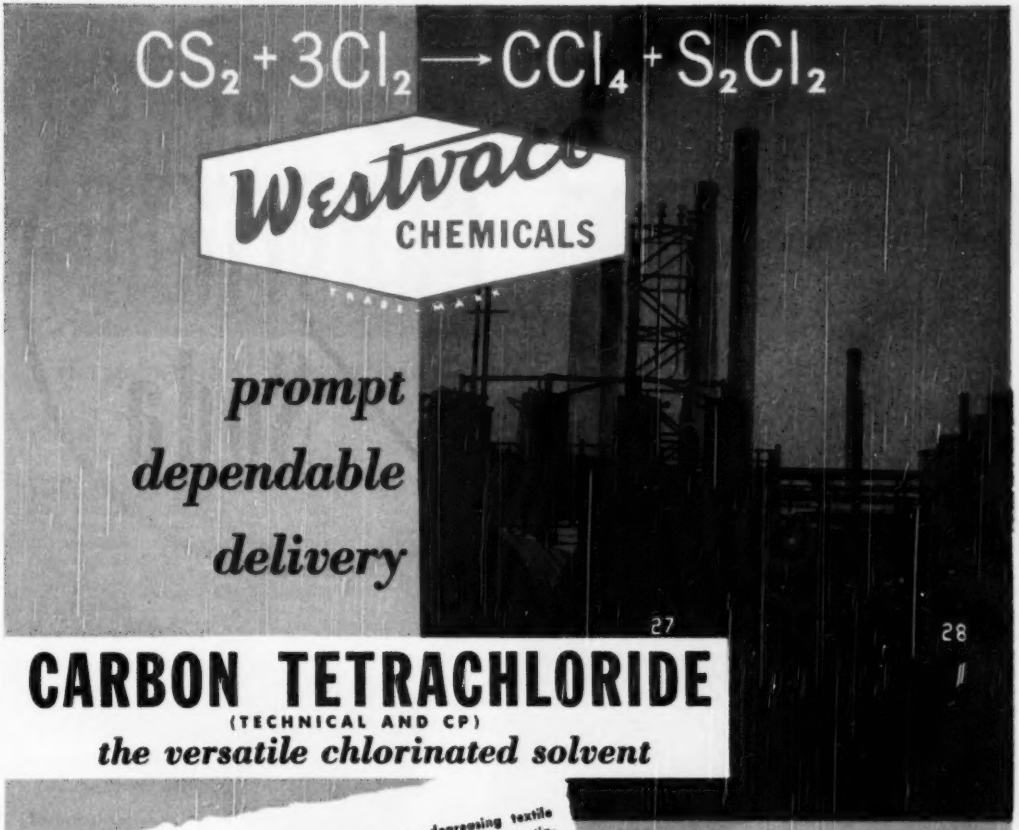

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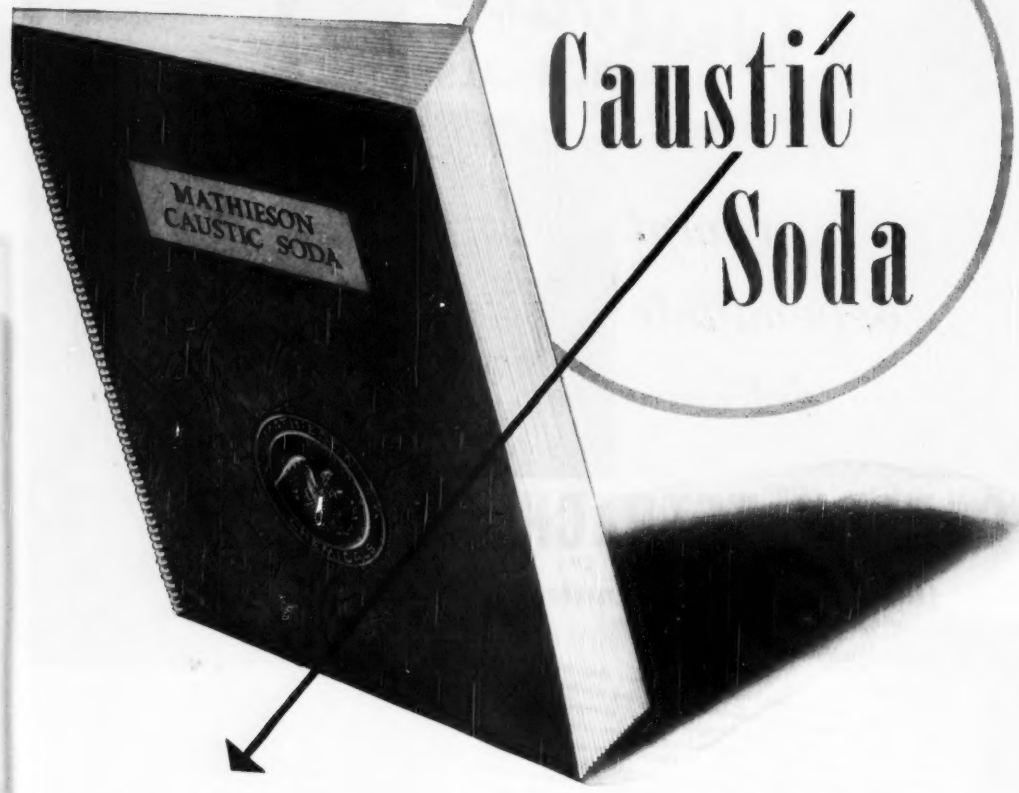

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Chemical Industries

Including CHEMICAL SPECIALTIES

Vol. 66, No. 4

APRIL 1950

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

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THE READER WRITES

Sodium Figures Fixed

To the Editor of Chemical Industries:

I would appreciate clarification of an apparent inconsistency contained in the article, "Metallic Sodium, Its Production and Use," in your November 1949 issue.

According to this article, metallic sodium capacity in the United States was 139 million pounds until sometime in 1949 when the Ethyl Corp. opened its new plant at Baton Rouge, La. A check of the total metallic sodium used in 1948, as shown in Table 4 on page 716 of this issue, indicates, however, that 171 million lbs. of metallic sodium was used in 1948.

I wish to express my appreciation for this highly informative and well-written article, which to my knowledge is the best summary of the metallic sodium industry which has been written for many years.

JOHN F. KULLGREN
Washington, D.C.

Unfortunately Table 4 contains a typographical error. In 1948 sodium cyanide and sodium alkyl sulfate accounted for 32 million lbs. of sodium together—not 32 million lbs. each. Thus the total consumption of 139 million lbs. in 1948 is correct.—ED.

To the Editor of Chemical Industries:

In your article metallic sodium, November, 1949, we were surprised to see that according to Table 2 manufacturers could sell sodium for $330.00 per ton while it cost them $32,958.00 per ton to manufacture it. After moving the decimal point two places to the left it became obvious that this must be a typographical error.

The next item that shook our credulity was that it seemed the cost of producing a ton of sodium was less at a reduced production rate. Below is what we consider to be a better picture of the relative difference in cost between the two rates.

ESTIMATED MANUFACTURING COSTS OF SODIUM METAL

(Per ton of sodium metal)

Investment/ton day of Na capacity		$200,000
Working capital @ 20% of gross sales		30,000
Operating rate, % of capacity	100	80
NaCl 2.65 tons @ 0.75/ton	$1.98	1.98
$CaCl_2$ 0.006 Tons @ 24.00/ton	.15	.15
Power 10.400 KWH @ 5.6 mils	$8.20	$8.20
Cooling water, steam, etc.	3.00	3.00
Maintenace @ 4% of investment	21.92	27.40
Wages, salaries & misc. exp.	50.00	62.50
Operating Cost	135.25	153.23
Add		
Depreciation @ 6.5% of investment	35.60	44.50
Insurance & Taxes @ 1% of investment	5.48	6.85
Total Manuf. Cost	176.33	204.58
Sales Cost @ 10% of gross sales	39.60	39.60
Research @ 3% of gross sales	12.05	12.05
Total Sales Cost	227.98	256.23
8% return on capital after income taxes of 38%	81.30	101.70
10% return on capital after income taxes of 38%	101.60	127.00
	329.58	383.23

THOMAS C. PONDER
WILLIAM L. HAMMOND
Lake Charles, La.

CI's face is red on this one.—ED.

Chemical Nucleus for War?

To the Editor of Chemical Industries:

Your magazine has done a great service to the chemical industry in publishing James V. Brennan's article entitled "Germany's Chemical Recovery." If we needed any further proof of the muddled thinking of our State Department and the Department of Commerce in connection with the rehabilitation of Europe, this was it. Instead of looking with apprehension at the rebuilding of the German chemical industry which would shortly form an industrial background for her next war effort, instead of pointing out how U.S. chemical exporters are losing their hold in foreign markets in the face of competition from German-made goods, Mr. Brennan smugly pats our military authorities on the back and says: "well done."

Under the misleading heading "Post-war Restrictions," Mr. Brennan details the simple procedures by which authority has been granted for the German chemical industry to produce approximately 98% of its 1936 level. He points with pride at the fact that the German industry is still prohibited from making synthetic rubber and butadiene, and is limited in its production of a few other chemicals. Does he believe for one moment that Germany will not immediately resume production of these items on a large scale, as soon as a peace treaty is signed, or our troops leave the country? Would it not have been wiser to destroy this war-making potential once and for all, now that we have the chance?

I, for one, would rather increase our Marshall Plan expenditures, if necessary, in order to build chemical industries in such peace loving countries as France, Belgium and Holland, than to pay the cost in dollars and lives for the next war with Germany, which our blind policy is surely helping to bring closer. It is no excuse to say that we must build up Germany in order to fight Russia. Be assured that if the catastrophe of a war with Russia does occur, both we and Russia will lose, and Germany will rise out of the scars of battle as the ultimate victor.

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CrO_3	99.75% min.
Chloride as Cl	0.02% max.
Sulfate as SO_4	0.10% max.
Insoluble in water	0.01% max.

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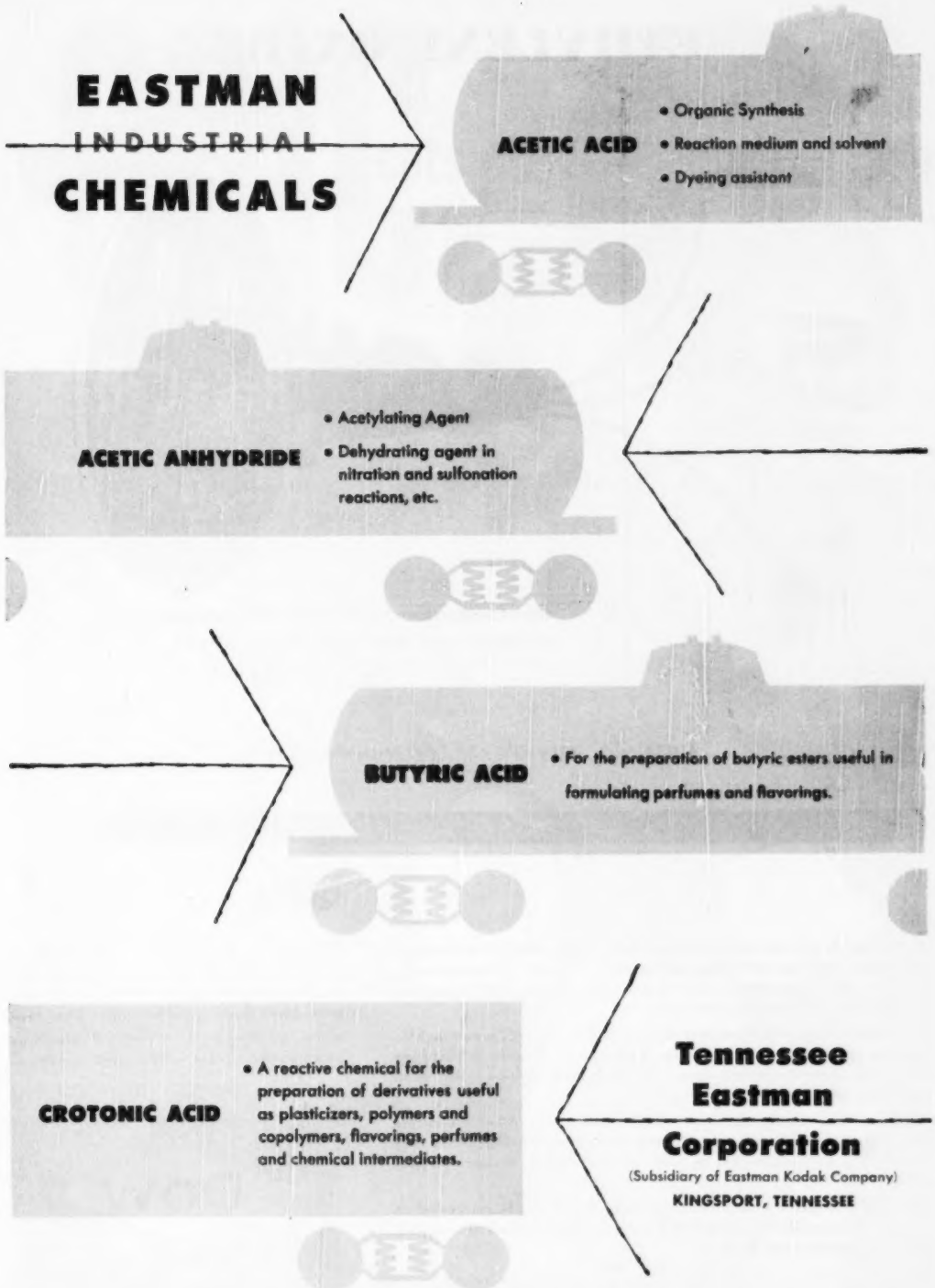
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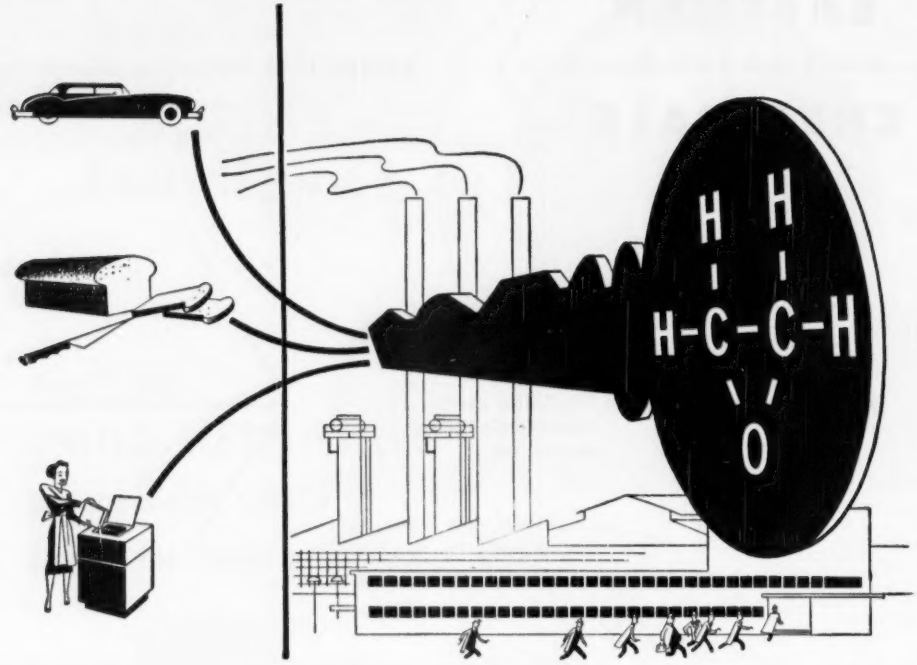

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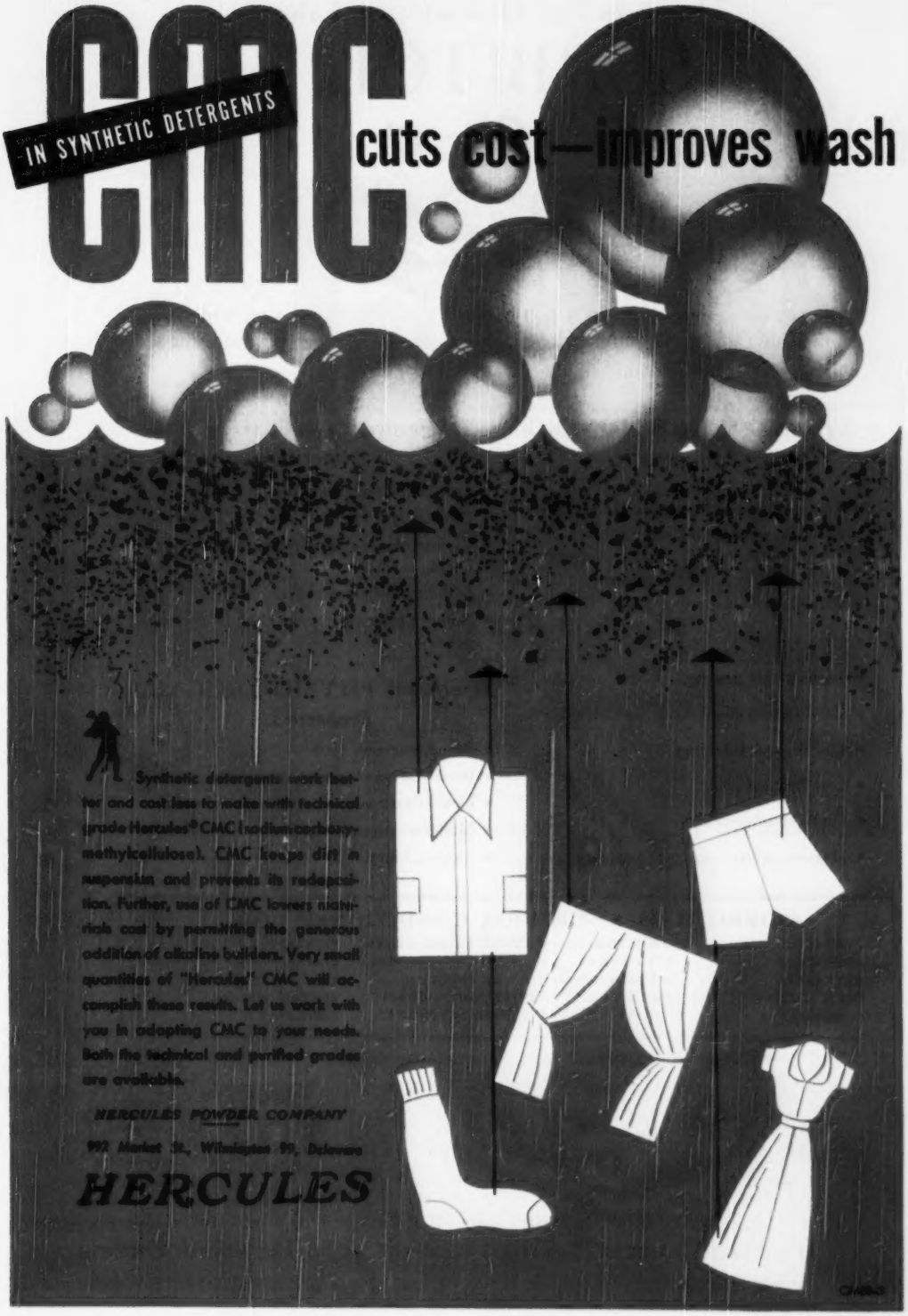

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Form	Clear liquid
Odor	Mild, characteristic
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Specific Gravity, 20/20°C	0.983 to 0.987
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Cloud test	Clear at 0°C
Containers	50-55 gal. non-returnable steel drums.

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Color	80 Hazen, Maximum
Form	Clear liquid
Odor	Mild, characteristic
Distillation at 5 mm. Hg, (5-95%) °C	189-222
Specific Gravity, 20/20°C	1.075 to 1.081
Acidity (as Phthalic Acid), %	0.01 Maximum
Saponification Number	364-374
Containers	50-55 gal. non-returnable steel drums.

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Color	50 Hazen, Maximum
Form	Clear liquid
Odor	Mild, characteristic
Acidity (as Phthalic Acid), %	0.01 Maximum
Specific Gravity, 20/20°C	0.983 to 0.989
Ester Content, % by weight	99 Minimum
Cloud test	Clear at 0°C
Containers	50-55 gal. non-returnable steel drums.

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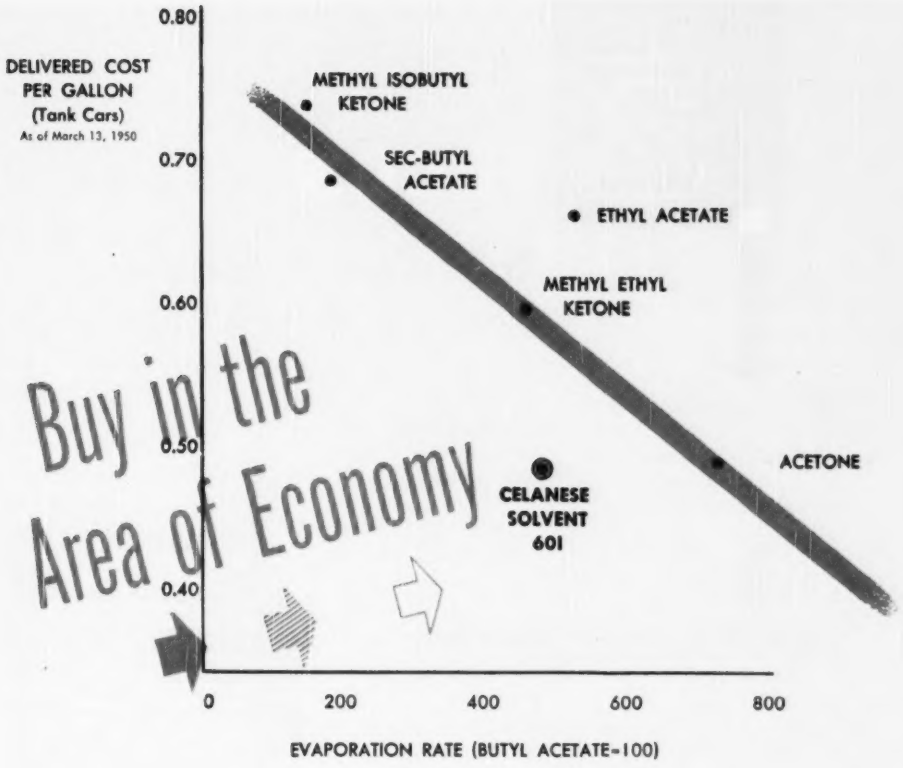

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It is no longer necessary to pay premium prices for an active solvent in order to get the evaporation rate you require.

Look at this chart. It shows the cost as a function of evaporation rate of five active solvents commonly used in nitrocellulose and other lacquers, and vinyl coatings. Inside the curve—*in the area of economy*—you'll find Celanese Solvent 601.

Celanese Solvent 601 can give you savings up to 16¢ per gallon. Substantial savings can also be made by supplementing the solvent power of methyl ethyl ketone with the cyclic oxides of Celanese Solvent 601. Call or write for prices and other technical information. Celanese Corporation of America, Chemical Division, Dept. 52-D, 180 Madison Ave., New York 16, New York.

Celanese* CHEMICALS

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ZIRCON

Zirconium Silicate—
67% ZrO_2 -- 33% SiO_2

FOR HIGH MELTING POINT,
HEAT SHOCK RESISTANCE,
LOW THERMAL EXPANSION,
ACID AND CORROSION RESISTANCE,
HIGH MECHANICAL STRENGTH,
GOOD ELECTRICAL RESISTIVITY.

MECHANICAL, THERMAL, CHEMICAL AND PHYSICAL PROPERTIES

Crystal Structure		Tetragonal
Bulk Density—		
Granular Zircon	180 lbs./cu. ft.	0.104 lbs./cu. in.
Milled Zircon	102 lbs./cu. ft.	0.059 lbs./cu. in.
Fired Rammed Body	216 lbs./cu. ft.	0.125 lbs./cu. in.
Fired Slip Cast Body	250 lbs./cu. ft.	0.139 lbs./cu. in.
Thermal Conductivity cal/°C/sec/cm/cm (Up to 700°F = 0.031 BTU/°F/sec/in/sq. ft.		= 0.0258
Mean Specific Heat	(21-31°C)	0.132 cal/gram/°C
Softening Point		3452°F (1900°C)
Cold Modulus of Rupture	Rammed Body—	1600-2600 psi
	Slip Cast Body—	7000-8000 psi
Melting Point	(2200-2260°C)	4000-4100°F
Thermal Expansion (mean reversible 20°-1000°C)		4.5 x 10⁻⁶/°C 2.5 x 10⁻⁶/°F

Insoluble in aqueous alkaline solutions and in all acids

ELECTRICAL PROPERTIES

Dielectric Constant K		12 ± 1
Resistivity at °F in Megohms/in.³	1100°	170
	1200°	120
	1300°	70
	1400°	25
	1500°	7
	1600°	2.5

IN HIGH TEMPERATURE APPLICATIONS

Such as pyrometer tubes—gas turbine combustion chambers—cyanamide processing containers—aluminum resmelting—phosphate, sulphuric acid and silica gel processing furnaces, Zircon offers definite advantages. Its properties make it an ideal body constituent in certain electrical porcelains. As a mold and core wash ingredient, it is in increasing demand and is receiving considerable attention as a mold material in precision alloy casting.

Granular and milled zircon of various purities are available also in addition to zircon refractories, ramming mixes and cements. During years of research and practical experience, a fund of information on the properties, applications and potentials of zircon compounds has been built up.

Specific data and practical suggestions may be obtained through our field engineers or by writing our New York office direct.

TAM PRODUCTS
Registered U. S. Pat. Off.

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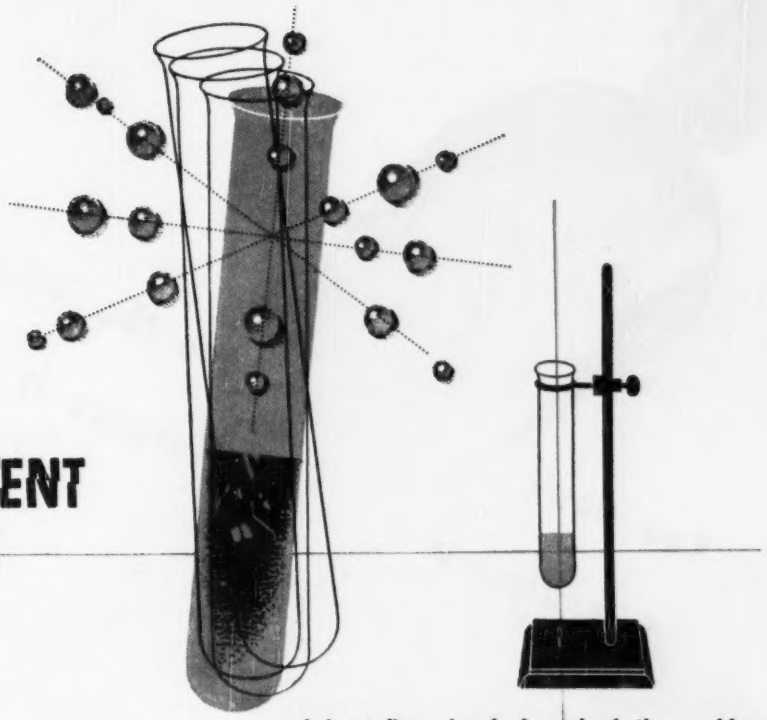
TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY

Executive and Sales Offices: 111 BROADWAY, NEW YORK, N. Y. • General Offices and Works: NIAGARA FALLS, N. Y.



the INCONSISTENT CATALYST

and how fine chemicals solved the problem for a synthetic rubber manufacturer

A manufacturer had trouble with the grade of Ferrous Sulfate he used as a catalyst. This was a technical grade, varying in ferric iron content and other impurities — and therefore not stable and consistent enough to give a uniform yield of a uniform product.

So he consulted Mallinckrodt. After carefully analyzing his difficulties, our technical experts recommended a special quality of Ferrous Sulfate, low in ferric iron content, packed in moisture-proof drums. That solved the problem: (1) because of the superior purity and stability of the chemical itself; (2) because the drums prevented troublesome hygroscopic action.

THE RESULTS: more controlled reaction — a smoother, faster and more economical process — a uniform product.

If you feel the need for chemical improvements, perhaps we can develop a new material . . . or perhaps we already have the chemical to fill your needs.

We are in business to find the answers to your fine-chemical problems — and we are looking forward to your questions.

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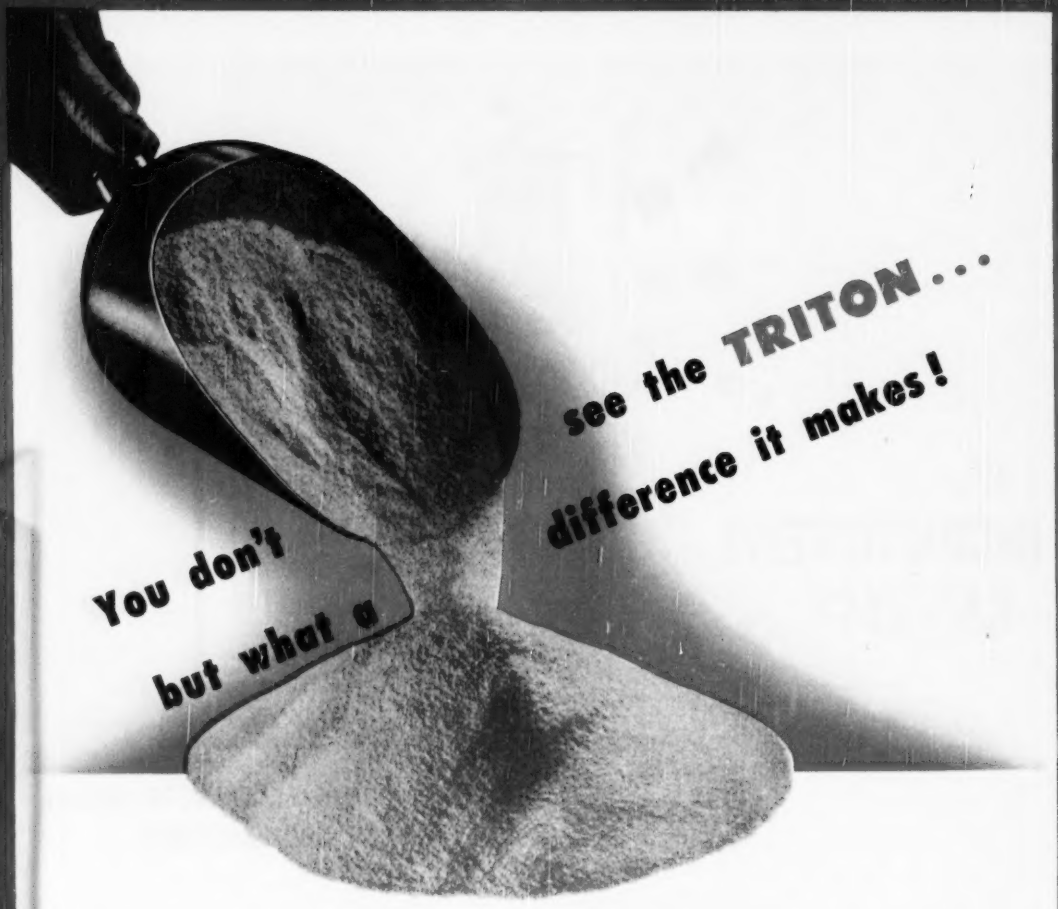
Manufacturers of Medicinal, Photographic, Analytical and Industrial Fine Chemicals



TRITON X-100 *does* make a difference in products —*and profits.*

From 3% to 5% of TRITON X-100 added to your balanced alkali formulation gives you a better, faster, foaming cleaner—with exceptional ability to emulsify grease and remove oily deposits from hard surfaces. Makes your cleaner *sneeze-proof*, too, and assures a more uniform blending of its ingredients.

TRITON X-100 is another member of the TRITON family that can help you make better products. Whether you manufacture cleaners or cosmetics, emulsion concentrates or household detergents, you'll find it good business to try the TRITONS.

Information on specific applications, and samples for testing in your formulation, are yours for the asking. Just mail the convenient coupon.

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I am interested in the TRITONS for use in_____. Please send me technical data plus free samples for testing in my formulation.

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U.S.I. CHEMICAL NEWS

April ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1950

Dimethyl Phthalate, Popular Plasticizer, Available from U.S.I.

U. S. Industrial Chemicals, Inc., manufacturers of diethyl, dibutyl and diamyl phthalate now have available another excellent plasticizer, dimethyl phthalate. Widely used in the cellulose acetate field, dimethyl phthalate is a colorless, odorless liquid, soluble in all the common organic solvents and oils except petroleum oils. In actual use, dimethyl phthalate is often combined with diethyl phthalate. U.S.I.'s high-purity product is finding wide use in plasticizing cellulose acetate sheeting and film, molding powders, and insulating lacquers.

Specifications

Acidity
Free acid as phthalic, not more than 0.01%

Color
Water-white

Water
None, as shown by the absence of turbidity on separation when admixed with 19 volumes 10° heptane with aromatics not over 5%

Odor
Odorless

Purity
Ester content as dimethyl phthalate, 99—100%

Specific Gravity
At 20°/20°C—1.192—1.194

Trifluoroacetic Anhydride For Direct Esterification

A method of esterification that does away with the necessity of a two-stage process and makes possible a fast direct reaction between acid and hydroxy compound under mild conditions was reported on recently by university researchers. The new esterification process involves the use of trifluoroacetic anhydride and is described as giving yields of 60 to 90%.

Suitable for Self-Esterification of Hydroxy Acids to Yield Polyesters

Customary procedure in the past for synthesizing esters from carboxylic acids and alcohols or phenols was to treat the reactants for several hours in the presence of a strong mineral acid catalyst or to proceed by way of the acid chloride or anhydride. The new method appears to be suitable for self-esterification of hydroxy acids to yield polyesters.

New Assay for Quinine Is Faster, Simpler

A new spectrophotometric method for determining quinine, described as faster and simpler than the official chloroform extraction-gravimetric method, has been devised. The researcher who developed the assay recommends it for control purposes in analyzing pure solutions of quinine encountered in processing operations or for analyzing intermediate or preliminary samples where official assay procedures do not have to be applied. The scientist states that the spectrophotometric method showed an average deviation of only ±0.4% from the gravimetric as an average of 20 determinations.

U.S.I. Launches 1950 Dairy Insecticide Program

Availability of Pyrenones Has Made Possible Tremendous Expansion in Use of Sprays for Direct Application to Animals

The season when fly control is the dairyman's chief concern is not so many months away, and so U.S.I. is launching its 1950 program to acquaint farmers, agricultural leaders, and insecticide manufacturers with the outstanding control that can be achieved safely with U.S.I. Pyrenones. Widespread concern over the possible misuse of some of the newer toxic insecticides led the Food & Drug Administration in 1949 to announce that the presence of possibly hazardous materials in milk might be cause for confiscation. In 1950 dairymen will be more safety-conscious than ever before.

Pyrenone-type sprays are safe to use directly on dairy cattle. They are non-toxic to warm-blooded animals, will not contaminate milk, meat, or other animal products.

Pyrenones Provide Maximum Safety

Though amazingly effective in controlling dairy insects, Pyrenones are non-toxic to warm-blooded animals. They cannot be stored in butterfat of milk or the fatty tissues of the body. Even ridiculously large doses, fed directly to test animals over a long period, have produced no ill effects. They will not contaminate milk, meat, or other animal products. This safety, coupled with the high insecticidal power of Pyrenones has made it possible to produce livestock sprays that are entirely practical for regular animal application.

Return to Direct Treatment of Animals with Protective Sprays

In the last few years, failure of surface spraying to solve the fly problem has led to a rapid increase in the use of protective sprays for animals. Conventional oil-type sprays and water emulsion sprays have enjoyed come-backs, and the one thing that has made possible this tremendous expansion in the use of livestock sprays has been the availability of Pyrenones.

MORE

Electric Heat for Pipes Proves Cheaper Than Steam

Use of tubular electrical heaters on storage tank pipe lines is reported to have reduced operating costs for a midwest oil company. Lines were formerly heated with steam to reduce viscosity of the stored fluid, but costs were high due to heat loss and uneven heat distribution. Electrical heaters are now clamped to the base of each storage tank and are wound around pipe lines and covered with protective layers of insulation to cut heat loss. Even distribution of heat throughout the pipe line is achieved through thermostatic control, according to the company.

Radioactive Phosphorus Aids in Metal-Spraying

An unusual use for radioactive isotopes is in the application of molten metal to surfaces (as a protective coating) by means of an electric arc pistol. An arc is struck between two metal wires fed into the pistol. The arc's heat melts the metal and a blast of air blows it away in the form of a spray. Ordinary air is not conductive and disrupts the arc. The problem is solved by ionizing air to make it conductive by first passing it over radioactive phosphorus.

Pressure-Welds Metals At Room Temperature

Welding metals by pressure at room temperature is reported possible now. Several types of non-ferrous metals, including aluminum, duralumin, copper, nickel, zinc, silver, and cadmium, can be cold welded by the new process. Its most important application is expected to be for cold welding aluminum. Experimental work on ferrous metals is reported in progress.

Publishes Safety Data On Hydrogen Sulfide

Publication of a chemical safety data sheet on hydrogen sulfide has been announced by a noted chemical association. Designed for use by management, supervisory staffs, and operating personnel, it is said to contain information essential to safe handling and use of hydrogen sulfide in transit, in the plant, and in the laboratory.

New-Type Synthetic Rubber

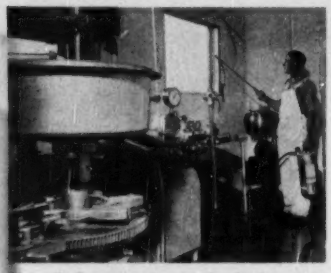
A new type of high-quality synthetic rubber is being made now from a turpentine derivative, scientists state. Main ingredient of the new elastomer is said to be isoprene.

CONTINUED

U.S.I. Dairy Insecticides

Protect Against Hard-to-Kill Horseflies

Pyrenone-type insecticides protect dairy animals, in the field as well as in the barn, against even the highly resistant horsefly or tabanid. They provide fast knockdown and high kill of horn flies, stable flies, houseflies, and other dairy insects. They are economical—dilutions as high as one part emulsifiable Pyrenone-insecticide to 39 parts water protect animals two weeks under normal conditions against horn flies.



Versatile Pyrenones are popular for insect control in milk rooms and other parts of dairy, farm, or ranch buildings, as well as for spraying cows and other livestock.

Many dairymen prefer Pyrenone-base insecticides because they can be had in oil-spray or emulsion forms, but Pyrenones are also available in wettable powders for those who prefer this form. Pyrenone insecticides can be used in any type of sprayer—hand gun, knapsack, aerosol, power sprayer, or steam vaporizer. They will not clog spray nozzles or corrode metal equipment, are non-staining, and will not harm paint.

Pyrenones' wide-range effectiveness makes them popular with dairymen for controlling a variety of farm, food-storage, and household pests. They are effective against roaches, silverfish, wasps, hornets, spiders, crickets, cheese skippers, ants, fruit flies, confused flour beetles, cadelles, and scorpions.

Precise Color Matching With New Instrument

A new precision color-matching instrument for textile, dye, and other industries is said to employ a combined electronic and optical computing system to simulate the response sensitivity and discrimination of the human eye, without the eye's variation in perception. Described as compact and light in weight, the instrument can be carried anywhere in the plant for on-the-spot sampling. Special preparation of samples is reported unnecessary in most cases since the device handles samples one-half inch in diameter and up.

The color matcher automatically accommodates itself, it is claimed, to the level of illumination of the samples being compared. Its range is said to be such that sensitivity exceeds that of the human eye for variations in brightness of 10,000 to 1, permitting comparison of samples reflecting only 2% to an accuracy of 0.5% of reflected light. The instrument is equipped to evaluate tristimulus color values relative to standard white and has a direct reading scale from 0 to 100%.

The device has an accessory sample viewer so that before actual color measurements are taken samples can be examined to make sure surface conditions and illumination are comparable to visual requirements. The sample viewer is useful in making precise measurements of many types of surface, especially where dark colors are encountered, the makers state.

Low-Cost Arthritis Drug Yields Dramatic Results

A new, cheap treatment for arthritis is said to have produced dramatic results in recent tests. Four patients were given the new treatment — injections of a synthetic adrenal gland hormone and vitamin C — and good results are claimed for three of the four cases. One patient, a fifty-five year old man who had been bedfast for six months is said to have walked ten minutes after his first treatment.

Doctors in charge of the treatments are optimistic but warn that it will probably be at least several months before final results are known. Enough drug for one daily treatment costs about $2, according to the doctors, as compared with a cost of $200 for an eight-day supply of another new arthritis drug, ACTH.

TECHNICAL DEVELOPMENTS

Further information regarding the manufacturers of these items may be obtained by writing U.S.I.

A new, extremely fast and efficient broiler that makes use of infra-red rays is said to cook steaks in 5 to 7 minutes, to require no preheating, and to be economical. It works on A.C. or D.C., does not smoke or spatter fat, and is easy to clean, the makers state. **(No. 559)**

Continuous indicating and recording of viscosity of hundreds of industrial liquids while under actual processing is reported possible with a new instrument, particularly adaptable to use in the textile, chemical, food, paper, plastics, and protective coatings industries. Viscosity range is reportedly 20 to 100,000 centipoises. **(No. 560)**

A flexible method of supporting lab apparatus is said to permit addition or removal of any supporting rod, either vertical or horizontal without dismantling any other part of the frame. **(No. 561)**

A new-type rubber-to-metal adhesive is claimed to bond natural rubber, GR-S, nitrile rubber, and neoprene to steel, stainless steel, aluminum, zinc, magnesium, brass, and nickel. Bonds reportedly resist aging, solvents and oils, and boiling water. **(No. 562)**

A new goniophotometer, for measuring the manner in which flat specimens reflect and transmit light is said to be the first offered with tristimulus filters for measuring color as a function of illumination and direction of view. **(No. 563)**

A new cold liquid spray for cleaning electric motors, claimed to dissolve grease fast, evaporate quickly, and to be practically inert to ordinary electrical insulation, is easy to handle because of its low flammability and mild toxicity, the makers state. **(No. 564)**

A new antifouling coating for preventing attachment of both sea and fresh water marine grass growths to boat bottoms is described as easy to apply and protects against barnacles, borers, annelids, algae, etc., it is reported. **(No. 565)**

New odorants for rubber, both natural and synthetic, are reported available. They are for use in foam rubber products, rubber-containing adhesives, and such rubber goods as gloves, girdles, hot water bottles, etc. **(No. 566)**

A flexible paint for auto tops is claimed to strengthen and waterproof fabric, stop unraveling, and anchor loose threads. **(No. 567)**

For painting hard-to-brush surfaces a new "electric paint brush" is said to make easier the refinishing of wicker furniture, radiators, and automobiles and the staining of shingles and plywood. The tool can be operated from 110-A.C. electric light sockets and can be used with water- and oil-based liquids. **(No. 568)**

PRODUCTS OF U.S.I.

ALCOHOLS
Amyl Alcohol (Isoamyl Alcohol)
Butanol (Normal-Butyl Alcohol)
Fusel Oil—Refined
Propanol (Normal-Propyl Alcohol)
Ethanol (Ethyl Alcohol)
Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof U.S.P., Absolute—200 Proof
Solox*—proprietary solvent—regular and anhydrous
ANTI-FREEZES
Super Pyro* Anti-Freeze
U.S.I. Permanent Anti-Freeze
ANSOLS
Ansol* M
Ansol* PR
ACETIC ESTERS
Amyl Acetate—Commercial and High Test
Butyl Acetate
Ethyl Acetate—all grades
Normal-Propyl Acetate
OXALIC ESTERS
Dibutyl Oxalate
Diethyl Oxalate
PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate
Diisooctyl Phthalate
OTHER ESTERS
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Diethyl Carbonate
Ethyl Chloroformate
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Acetoacet-ortho-chloroanilide
Acetoacet-ortho-toluidide
Acetoacet-para-chloroanilide
Ethyl Acetoacetate
Ethyl Benzoylacetate
Ethyl Sodium Oxalacetate
ETHERS
Ethyl Ether, U.S.P.
Ethyl Ether, Absolute—A.C.S.
ACETONE — A.C.S.
FEED PRODUCTS
Choline Concentrates
Curbay B-G*
DL-Methionine
Riboflavin Concentrates
Special Liquid Curbay*
U.S.I. Animal Protein Factor Supplement
Vacatone* 40
RESINS (Synthetic and Natural)
Arochem*—modified types
Arofene*—pure phenolics
Aroflat—for special flat finishes
Araplaz*—alkyds and allied materials
Congo Gums—raw, fused & esterified
Ester Gums—all types
Natural Resins—all standard grades
INSECTICIDE MATERIALS
CPR Concentrates: Liquid & Dust
Piperonyl Butoxide
Piperonyl Cyclonene
Pyrenone* Concentrates: Liquid & Dust
Pyrethrum Products: Liquid & Dust
Rotenone Products: Liquid & Dust
INSECTIFUGE MATERIALS
Indalone*
Triple-Mix Repellents
OTHER PRODUCTS
Collodions
Ethylene
Nitrocellulose Solutions
PiB*—Liquid Insulation
Urethan, U.S.P.
Special Chemicals and Solvents

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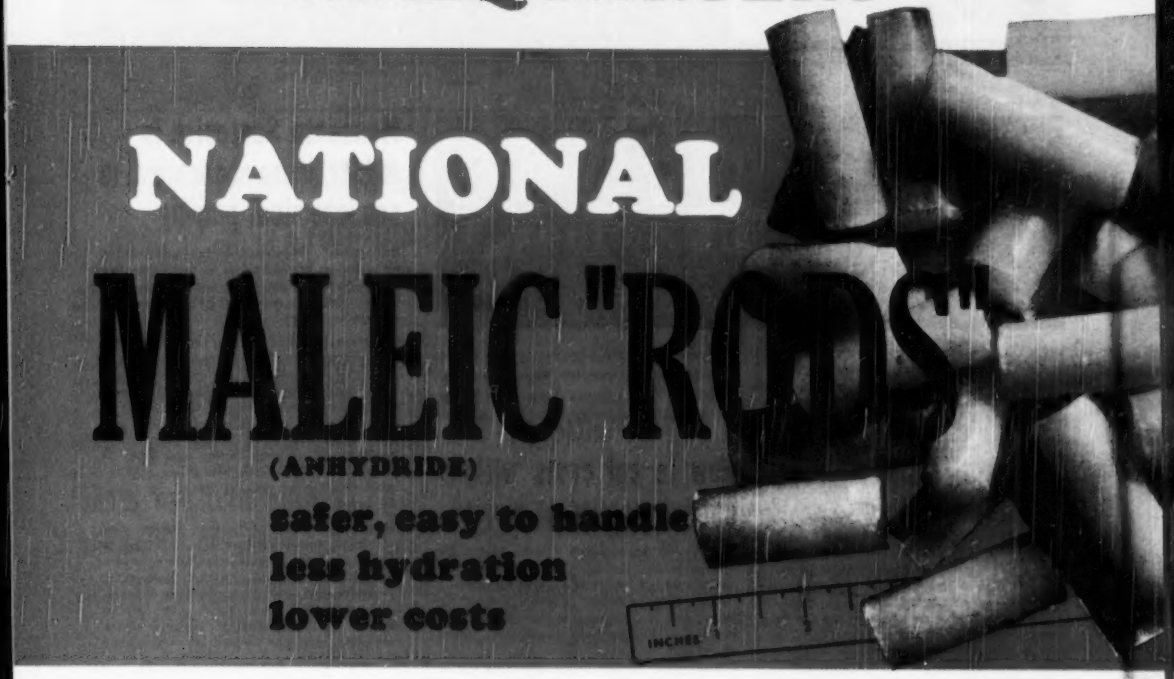

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FUMARIC ACID · MALIC ACID · SUCCINIC ACID

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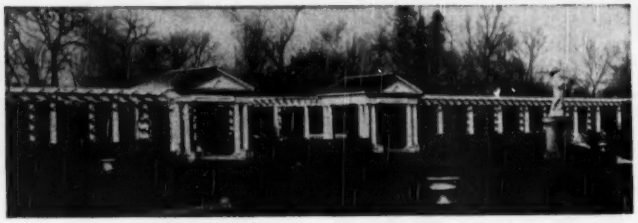
For Your Information

Every month Monsanto publishes these pages of pertinent information, selected to help you improve your products, lower your production costs, increase your sales . . . Reprints will be sent regularly to you, or other members of your organization, on request.



WOOD, used in construction of this Italian Pergola in world-famous Missouri Botanical Gardens in St. Louis, was treated with a formulation of Monsanto's PENTA-chlorophenol to give it longer life. Wood, including redwood, Douglas fir and cypress, was treated to prevent attack by fungi and insects. And, in this example of Italian art, treated wood had to be paintable.

Look into this New Monsanto Product

Here's a new Monsanto product that may be of use to industry. It is phosphorous acid . . . H_3PO_3 . . . a mild reducing agent. It is a stable, water-white, 70% water solution suitable for the manufacture of a variety of phosphite salts. It is available for immediate shipment in 13-gallon carboys. Send for Monsanto Technical Bulletin No. P-32 and see if this product fits into your production or research picture. The coupon is for your convenience.

How to cut costs without cutting quality of vinyls

The use of Monsanto's HB-40 (partially hydrogenated terphenyl) as an extender plasticizer is a means of cutting costs while maintaining quality. HB-40, extremely low in cost, can be used to replace as much as 50% of the primary plasticizer, based on weight.

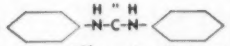
HB-40 is practically water-white for use in transparent or bright-colored products. It is low in toxicity, gives a dry "hand," increased tensile strength, has excellent electrical characteristics and high resistance to moisture. Mail the coupon for details.

Research Chemists' Corner

You may find something new here

Chemists who are looking for ways to improve products or develop new ones, may profit from studying the specifications of Monsanto's thiocarbanilide (diphenyl thiourea) given below. Research in the application of this product is far from exhausted. If you'd like to test thiocarbanilide for its possibilities in your projects, we'll be pleased to send you a sample without cost and without obligating you in any way. Just indicate your wishes on the coupon!

THIOCARBANILIDE (Diphenyl Thiourea)

Structure: 

Moisture: 0.5% maximum (test must avoid decomposing conditions)

Ash: 0.5% maximum

Specific Gravity: 1.32 at 25° C.

Solubility: Soluble in alcohol. Insoluble in water and many other common solvents.

Two grades are available, one a white powder melting at 148° C. minimum and the other a white-to-grey powder melting at 146° C. minimum.

Reactions: A weak organic base. Boiling with hydrochloric acid results in formation of phenyl isothiocyanate. The sulfur can be removed by PbO in alcohol solution forming carbodiphenylimide or, in the presence of ammonia, diphenylguanidine. Condensation with CS_2 and sulfur under pressure produces 2-mercaptobenzothiazole.

Monsanto Santosite is milder, more economical in semichemical pulping

Santosite* (Monsanto's sodium sulfite anhydrous, technical) is a mild pulping agent for hardwood, mixed wood, flax, hemp, and many cellulose-bearing agricultural residues.

With hardwood of high lignin content and with mixed woods, Santosite delivers a good yield of pulp having relatively long fiber. Because of its mild action, Santosite does not destroy fiber in the process of delignification. Santosite solves the special problems that hamper ordinary methods of pulping hemp and flax. It pulps straw, corn stalks and other agricultural residues to make a variety of quality products.

Santosite is safe and easy to use because it is clean, non-toxic and non-irritating to workmen. Even in small quantities, Santosite is highly efficient. Less time is required for shutdowns to clean up beaters, screens, felts and other equipment. For further details on semichemical pulping with Santosite, mail the coupon or contact the nearest Monsanto Sales Office.

OTHER MONSANTO HEAVY CHEMICALS

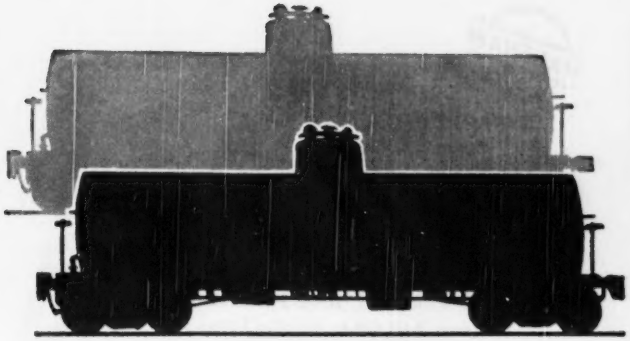
Basic Chrome Sulfate (Santotan*) for tanning industry
Salt Cake (Sodium Sulfate, Technical)
Sulfur Dioxide
Muriatic Acid
Nitric Acid
Sulfuric Acid
Chlorosulfonic Acid

Synergism brings higher detergency

In processes such as textile scouring, where high detergency is desirable, the synergistic action of Santomerse* No. 1 and tetrasodium pyrophosphate (TSPP) pays a bonus.

Synergism, or synergistic action, is the result of two chemicals working together to give detergency higher than the average of the two used separately . . . higher than either used alone.

If detergency is important to you, look into the possibilities of synergistic action of these two Monsanto products. For details, mail the coupon.



Liquid phthalic anhydride available in tank cars

Phthalic anhydride, usually reduced to dry flakes for handling, shipping and storage and changed back to liquid form for processing, is going directly to some Monsanto phthalic users in liquid form.

The liquid phthalic is slightly less expensive due to manufacturing economies. Further savings are effected by users because of reduced handling. Color and quality of the material are unaffected. There is some indication that the elimination of flaking results in a product of improved quality.

Monsanto, with more than 15 years' experience handling and storing liquid phthalic, offers technical information on liquid phthalic handling and storage to firms using this product in appropriate quantities.

At present Monsanto liquid phthalic anhydride is available generally only in tank-car quantities. Shipments are being made to some localities in tank-trucks.

Shoes can turn water but still "breathe"

Men who work outdoors, sportsmen and others who find it necessary to ignore the weather have the promise of good news in shoes. Monsanto's octadecyl isocyanate . . . $CH_3(CH_2)_{16}CH_2NCO$ . . . makes leather water-repellent yet leaves the pores open, so shoes can "breathe." Thus, shoes can afford protection against wet weather without sacrificing comfort.

This may be good business news for you. Octadecyl isocyanate also imparts similar quality to surface coatings, paper and textiles. Perhaps it fits into your production problem. It is a valuable intermediate in hydrophobizing processes. Because of Monsanto's expanded capacity, octadecyl isocyanate is in good supply.

Mail the coupon for a copy of Technical Bulletin No. P-125 which gives you complete details.

FOR YOUR LIBRARY

Timely Monsanto publications, listed below, will be sent to users of chemicals on request . . . free and without obligation. Indicate the items you want on the coupon.

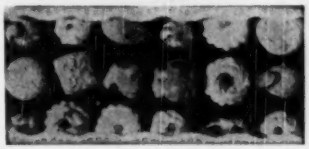
Monsanto Chlorine . . . 20 pages of information, including history, technical data, safe-handling suggestions.

Emulsifiers and Wetting Agents for herbicidal and insecticidal formulations. 12 pages of data on emulsifiers, wetters, solvents, formulations . . . procedures and equipment. (Technical Bulletin P-142.)

Handle Parathion Safely. Illustrated folder for safe handling of parathion by formulators, distributors and users.

Phosphoric Acid. 12 pages of technical data. (Technical Bulletin P-26.)

Aromatic Chemicals Improve Packages



Packages which carry candy, cookies, ice cream and other foods now give extra protection to their contents through the use of Monsanto Ethavan,* vanillin and coumarin. These aromatic Monsanto Chemicals "mask" undesirable odors and tastes which some products pick up from cardboard and paper pulp, allowing products to retain their appealing flavors and aromas.

Paper makers accomplish this "masking" by adding blends of Ethavan and coumarin, or vanillin and coumarin. The chemicals are dissolved in hot water and mixed into the pulp, or flowed on, depending upon the type of paper being produced.

Something to do about mildew

With the arrival of summer's hot, humid weather comes the problem of mildew . . . an expensive problem in many parts of the country. It's one which laundries can solve inexpensively by using Monsanto Biolite in the rinse water before acidic scouring rinse. For further information, mail the coupon.

*Reg. U. S. Pat. Off.

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Send literature as indicated:
☐ Monsanto Chlorine, ☐ Emulsifiers and Wetters, ☐ Parathion Safety, ☐ Phosphoric Acid, ☐ Bulletin P-125, ☐ Bulletin P-32.

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- Chrome Oxide

ELECTROPLATING
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- Cadmium Oxide

CATALYTIC PROCESSING
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- Synthetic Optical Crystals
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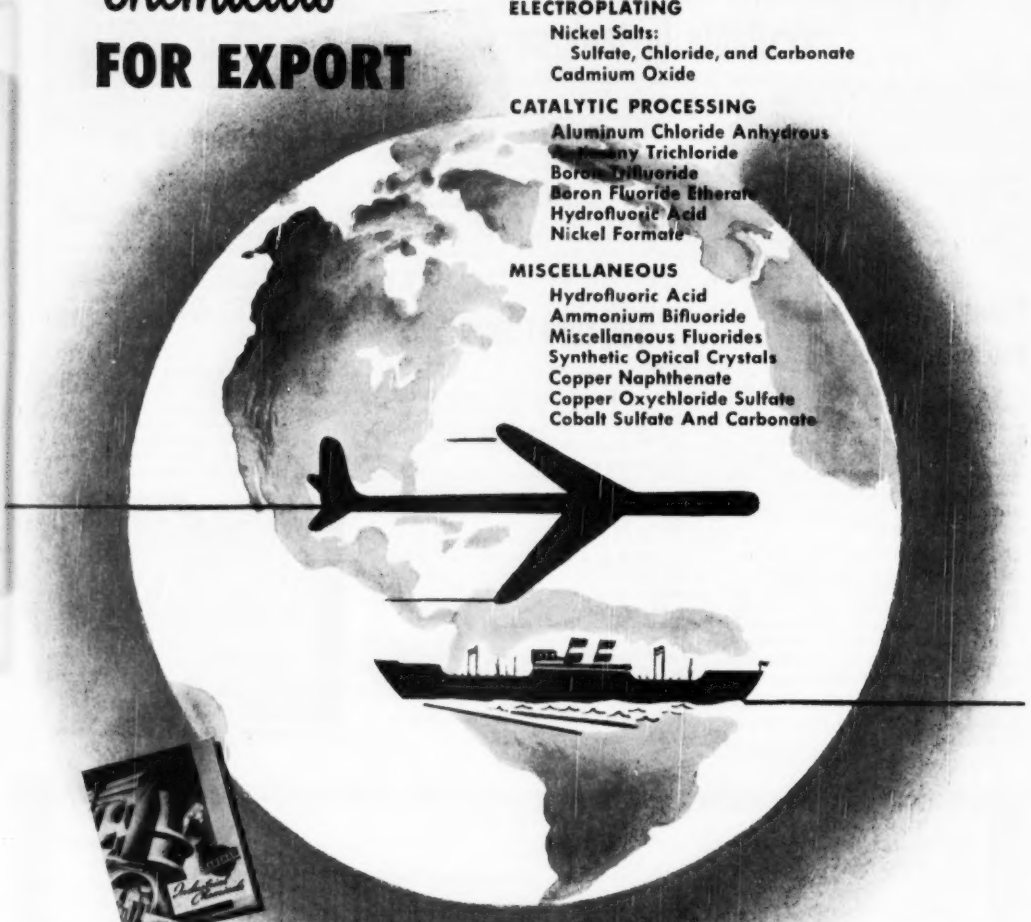
- Copper Oxychloride Sulfate
- Cobalt Sulfate And Carbonate



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This 32 page book alphabetically lists all chemicals available. Relates the history of the Company and describes Harshaw's major activities.

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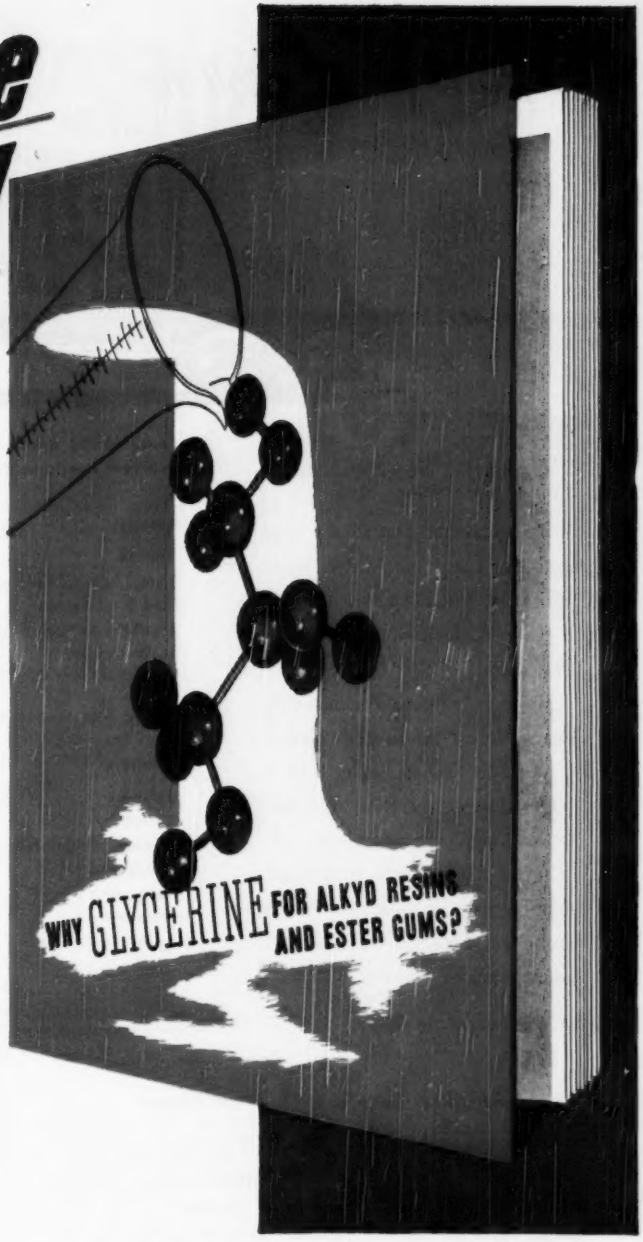
Whether you now use glycerine or just wonder about its possibilities . . . whether you're in management, production, or research . . . an expert on glycerine, or thoroughly unfamiliar with the subject—you'll want this informative booklet. Write for your free copy—today! *Address: Dept. 3, Glycerine Producers' Association, 295 Madison Avenue, New York 17, New York.*



One of a series of five booklets on the industrial applications of glycerine. Also available on request: Why Glycerine? (a general survey of all main uses) . . . Why Glycerine for Drugs and Cosmetics? . . . Why Glycerine for Foods? . . . Why Glycerine for Textiles?

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Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
April, 1950

For Your Information:

While CI last month (p. 348) was predicting synthesis of benzene from petroleum before long, Pan American Chemicals Division of Pan American Refining Co. was quietly making synthetic benzene at Texas City. Production actually started last Fall. And this month Shell Chemical Corp., moving faster than expected, will be synthesizing benzene at Dominguez, Cal. Neither company will talk price, but it is believed to be 40¢ a gallon f.o.b. plant. Mark-up over coal-tar benzene (@ 22¢ f.o.b. plant) is high, but contract customers are assured a steady supply. Pan American is prepared to make 3 to 5 million gal. a year from cyclohexane and methylcyclopentane.

Mathieson Hydrocarbon Chemical Corp., owned jointly by Mathieson Chemical Corp. and outside stockholders, will produce chemicals (largely ethylene oxide and glycol, probably) southwest of Louisville, Ky. Raw material will be stripped from Tennessee Gas Transmission Co.'s 800-million-cu.-ft./day gas throughput, lowering its BTU value from 1048 to 1033. Tennessee Gas will finance and construct the $12-million stripping plant. Interesting angle: Tennessee gets much of its gas from Chicago Corp. wells, and a combine including Chicago Corp. is also planning to make glycol (CI, February 1950, p. 175).

* * CI * *

Having provided for disposal of soda ash operations waste, Solvay has resumed its $20-million postwar construction program. The soda ash plant at Syracuse, N. Y., is now being modernized and rebuilt. Units already completed at that location are for production of chlorinated benzenes, mercury-cell caustic and chlorine, calcium chloride, sodium sesquicarbonate, dense ash, and compounded detergents.

Dow Chemical Co. will shortly install an additional ethylene unit at its Midland plant. Separation will be accomplished by Hypersorption, in a unit to be constructed by Foster-Wheeler Corp. Dow, you may recall, was the first commercial user of Hypersorption (CI, June 1949, p. 911), also for ethylene.

* * CI * *

Coal-tar chemical manufacturers are concerned over an administration bill whose sponsors are quietly trying to push it through via the committee route. Aimed at customs simplification, the bill would change the basis of ad valorem tariff rates from "American selling price" to "foreign value". This would be a body blow to certain domestic dyes and pharmaceuticals which sell in this country for as much as twice their foreign value. Main fear is that the new basis would require such a large increase in ad valorem rates in order to protect domestic output that there would be little chance of getting such an increase.

Jefferson Chemical Co. has just started pilot-plant production of alkyl phenol C-9 (nine carbon atoms) and is considering a commercial unit. Principal market is expected to be non-ionic detergents. The company is also now producing diethylene glycol commercially.

Expansion of furfural capacity is implicit in Du Pont's announcement that 400 million lbs. of corn cobs (about 40 million lbs. of furfural) will be required annually for adiponitrile via that route. Quaker Oats Co. is now reviewing the situation, calls expansion "a distinct possibility".

Plans to rebuild the explosion-damaged hydrogen cyanide unit at Kearny, N. J., are being finalized by Koppers Co. Permission to rebuild has been granted by the State Department of Labor and the Kearny City Council.

* * CI * *

Dow Corning Corp. is test-marketing a silicone-coated dusting-cloth, Cornelia Cloth. Lintless and odorless, it doesn't feel oily nor does it impart an oily surface to glassware and furniture. It is said to give a rich luster and to form a dirt- and water-repellent film. Priced at 25¢ (three for 69¢), it lasts about a month.

McLaughlin Gormley King Co., Minneapolis, has acquired patent rights for insecticide synergist "264" (Van Dyk & Co.) and will offer it for use with pyrethrins and allethrin. The latter when "souped up" with 264 is very effective against both flies and cockroaches.

* * CI * *

Hercules Powder Co. is studying the production of high-purity para-cresol and the possibility of making it commercially. A pilot plant is currently being operated at its Brunswick, Ga., naval stores plant.

A new commercial-size paraformaldehyde unit is planned by Celanese Corp. at its Chemcel, Texas, plant. Construction probably will not start until Fall at the earliest.

* * CI * *

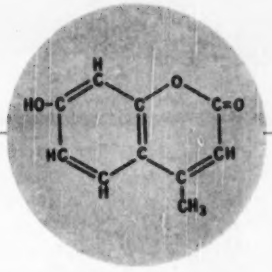
Here and There:

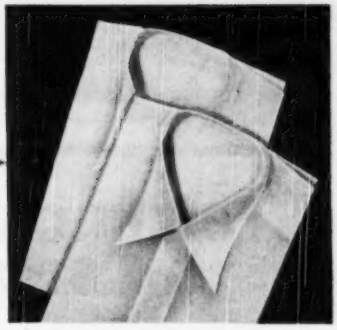
Contrary to published reports, U. S. Industrial Chemicals, Inc., will not be the selling agent for chemicals produced by the Chicago Corp. combine. . . . Look for further streptomycin price cuts. Current output is double to triple domestic needs, and completion of foreign plants may reduce exports 40 to 50% over the next twelve months. . . . Cold rubber demand is currently below the 183,000-ton annual capacity. Recent natural rubber price increases may, however, overcome users' inertia, persuade them to switch to synthetic.

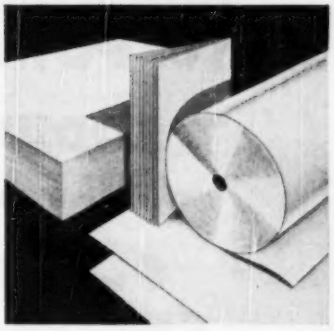
Manufacturers of aerosol air deodorants are looking hard at squeezeable polyethylene bottles, now used for underarm preparations. For space use, mist must be fine enough to stay suspended in air. . . . In an ammonia process just patented by Mathieson Chemical Corp. (U. S. No. 2,500,008), nitrogen and hydrogen are combined in the presence of a finely-divided catalyst by ultrasonic vibrations of more than 20,000 cycles a second. . . . A new permanent starch, Starch-Eze, is being retail test-marketed by Monsanto in Wichita, Kan. This is Monsanto's first entry into the retail market outside the West Coast.

The Editors

Make them *whiter and brighter* with Koppers BMU





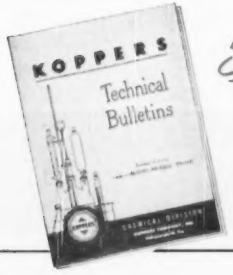


SOAPS and soap products, textiles, paper and paper-coating compositions are often improved by the addition of bluing agents or "optical bleaches" which neutralize yellowish tints and give greater whiteness and brightness.

Koppers beta-Methyl Umbelliferone (BMU) has been found very useful for this purpose. It emits a blue fluorescence and lends a whitening effect to the final product.

The ultraviolet absorption characteristics of Koppers beta-Methyl Umbelliferone suggest other important uses . . . as an ultraviolet light screening agent in suntan lotions, oils and creams . . . in the preparation of ultraviolet absorptive films and sheets.

Koppers beta-Methyl Umbelliferone is an intermediate in organic synthesis. BMU is a substituted coumarin and undergoes many of the reactions of this class of compound, such as nitration, acylation, hydrogenation and saponification.



Send for this bulletin

Bulletin C-9-111 describes thoroughly the physical and chemical properties of Koppers BMU, and enumerates many of its industrially important uses. Write for your copy.

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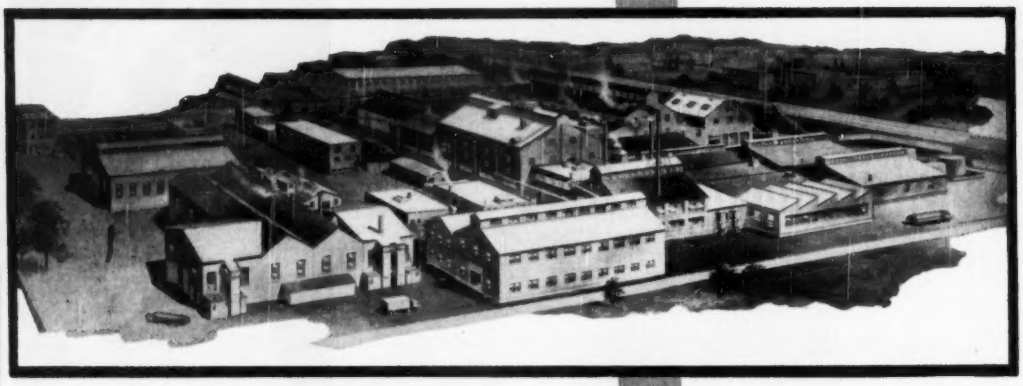

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THE PACE THAT PROSPERS

by ***ROBERT L. TAYLOR, Editor***

IN ACCEPTING THE FIRST Commercial Chemical Development Association award last month, H. B. McClure said some things that struck us not only as rather remarkable but also as symptomatic of something the chemical industry has been undergoing ever since the war.

We are thinking particularly of the rate at which this business of making and selling chemicals seems to be moving.

Mr. McClure's company, the Carbide & Carbon Chemicals Division of Union Carbide & Carbon Corp., is one of the pace-setters. During the past two years, it has nursed 42 new chemicals to the point where they are being shipped in containers of 55 gallons or larger. Of these 42, seventeen have gone a step further and reached the carload category. Mr. McClure merely mentioned in passing the several hundred products which have graduated from the Carbide research laboratories but have not yet reached drum status.

A new carload chemical every six weeks! Could even the largest producers have envisioned such a pace a decade ago?

It is quite true that Carbide is engaged almost wholly in a branch of chemistry—the aliphatic compounds—which is currently enjoying an unusual surge as a result of the widespread general interest in petroleum-derived chemicals. But it is no secret that Carbide is not alone in the intensiveness with which it is exploring new molecules, new uses for old ones, and is pursuing these explorations through to commercial realization.

The Carbide record in introducing new products is an outstanding one, and hence hardly typical, but there are indications that it is symptomatic of an entirely new tempo, a general step-up in development activity which has pervaded much of the chemical industry since the war.

We see one manifestation of it in the constantly increasing number of "New Chemicals for Industry" that are described in this magazine annually and displayed at the chemical expositions. Another is to be found in the newly-formed Commercial Chemical Development Association itself. Ten years ago there was no group activity of any kind devoted to chemical development. Today CCDA, a live-wire and growing organization, concerns itself almost entirely with the problems of bringing new products from test tube to tank car.

There are some who question the wisdom of this increased emphasis on new products. They feel that it is wasteful, that it may result in over-extension and over-expansion in good times. Certainly it is hard on those who have difficulty in keeping up.

Progress has always been hard on those who can't keep up. As for the other dangers, if research and new product development are conducted with due regard to the accepted principles of good business there is no reason why they should have any weakening effect. On the contrary, the effect should be just the opposite. On the question of waste, any new product which can create a profitable market on a basis of lower price or superior properties means more efficient—not less efficient—use of our resources.

Yes, if the chemical industry has achieved a new peacetime pace, we believe it is a pace that prospers, both for the industry and for the nation. It is bound to carry chemicals forward still further, through an increasingly direct fulfillment of the needs of daily living. Those who have not geared themselves to it will have to do so or see themselves submerged by their competitors.

Showcase Plants

DON'T GET US WRONG. We're all for good housekeeping, good working conditions, and a plant that is an asset rather than an eyesore to the landscape.

But in a chemical plant there are still virtues in the old principles of efficient layout, ease of maintenance, maximum production per unit of space. Their importance hasn't been diminished by thirty-cent dollars or the new emphasis on aesthetics in industry.

We trust that they will still be found behind the shiny facades of some of the newest monuments to the chemical century.

in paper manufacture— Only a small amount of Tributyl Phosphate is required—usually less than 0.1% by weight based on the solids, depending on the application involved. Thus, a minimum of Tributyl Phosphate remains in the final product with no residual odor. Because of its high efficiency, Tributyl Phosphate is the preferred anti-foam in the paper industry.

tributyl phosphate

ANTI-FOAM AGENT

Tributyl Phosphate is an odorless, colorless liquid, is miscible with most common organic solvents, and is a good solvent for a variety of other materials. It has a surprisingly low melting point for such a high-boiling liquid.

for synthetic latex paints

Addition of a fraction of 1% (based on solids) to this type of paint reduces foaming during application and improves the leveling characteristics of the paint film. Synthetic latex paints sometimes tend to coagulate during application and Tributyl Phosphate minimizes this tendency.

other uses—Tributyl Phosphate has helped solve many industrial foam problems encountered in the manufacture of such products as—inks, textile sizings, casein solutions, water-soluble adhesives, and rubber latex.

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Specific Gravity at 20°/20°C .....0.973 to 0.983
Acidity as Phosphoric Acid.....0.05% by wt. max.
Water .....No turbidity when one volume is mixed with 19 volumes of 60° Be. gasoline at 20°C.
Color .....Water-white

PROPERTIES OF COMMERCIAL GRADE MATERIAL

Boiling Point at 27 mm. of mercury .....177°-178°C
Melting Point.....Below —80°C
Flash Point, Cleveland Open Cup: 294°F
Viscosity at 25°C.....3.41 centipoise at 85°F.....38.6 Saybolt seconds
Dielectric Constant at 30°C 7.97
Weight per U. S. Gallon ..... 8.13 pounds at 68°F
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Solubility of Water in Tributyl Phosphate ....Approx. 7% by volume at 25°C

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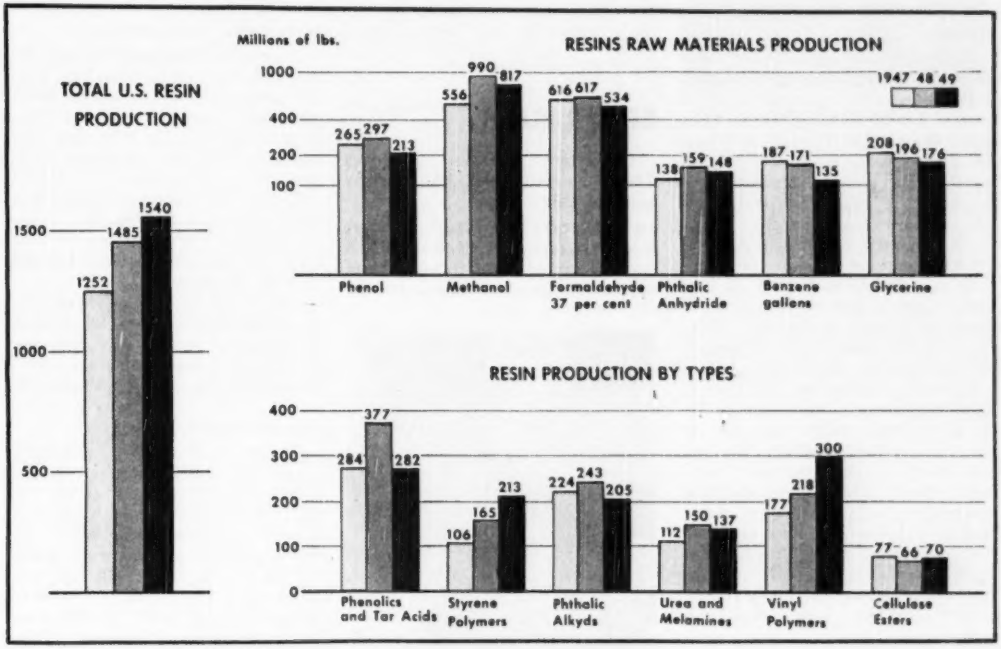
What's new



RESINS GRAZE SUPPLY CEILING

Limited supplies of benzene, chlorine, and glycerine will restrict expansion of vinyls, phenolics, polystyrene, and alkyds production.

SYNTHETIC resin production hit 1,540 million pounds last year as its steady climb carried it 50 million pounds above 1948's record total. Furrowed brows and addition of many gray hairs, however, accompanied the establishment of this new record.

Hindsight—alway simpler and more obvious than foresight—reveals that conditions were not as bad as they seemed. But any time that the production rate for phthalic anyhydride drops off more than 50% in six months is time for cogitation. Such violent swings are usually indicative of a more cancerous condition than the inventory recession that actually existed.

That it was merely the latter is seen from the monthly production statistics on alkyd and vinyl resins, the two largest phthalic consumers. While the phthalic production rate headed for the depths, alkyd production held steady and vinyls actually showed a sizable increase. Inventories soon gave out and new monthly production records were being set at 1949's close with every promise of continuation into this year.

Raw Materials

The situation was not so rosy for all resin raw materials. Three—benzene, glycerine, and chlorine—show signs of being in short supply during 1950. But shortages of these materials could prevent any sizable expansion in the first four of the six tabulated major production categories: phenolics, polystyrene, vinyls, alkyds, urea and melamines, and cellulose esters.

The ceiling which exists on the supply of benzene does not auger well for major expansion of either polystyrene or phenolic resin. In the case of polystyrene, demand for styrene-based synthetic rubber will be an important factor. As noted last month (*CI, March 1950, p. 348*) the will-of-the-wisp of synthetic benzene is assuming a more definite form; but synthetic benezene will probably require even higher prices than those which exist at present—probably 3-5 cents per gallon more.

Chlorine

The long-time oversupply of caustic soda (*CI, June 1949, p. 936*) coupled with the resultant inability to expand chlorine output is not conductive to any increase of the two vinyl monomers, vinyl chloride and vinylidene chloride, or of phenol via direct chlorination of benzene. However, alternates which do not require elemental chlorine are available for vinyl

chloride synthesis (acetylene plus hydrogen chloride) and for phenol production (either sulfonation or the Raschig process). A variant of the Raschig process is being used by the Bakelite Division of Union Carbide and Carbon Corp. in its huge new phenol plant now under construction at Marietta, O. *(CI, May 1949, p. 744).*

Glycerine

Without Shell Chemical Corp.'s new synthetic glycerine plant consumers would be shutting up shop instead of merely having to look harder than usual for supplies. Production of soap has dropped as the result of heavy competition from synthetic detergents, and by-product glycerine from that source has dropped proportionally.

Another aid in maintaining glycerine stocks at working levels was the heavy imports at the end of the year. If these imports should stop without a corresponding decrease in demand, a slowdown in the production of glycerine-derived materials would shortly follow.

It would appear that the time is ripe for upping synthetic glycerine. On the other hand, synthetic glycerine by the Shell process requires chlorine; and chlorine is one of the major have-not chemicals. One way out would be production of chlorine from waste hydrogen chloride. Another exit from the predicament is construction and operation of a plant to carry out the much discussed fermentation glycerine process starting from black-strap molasses.

Products

Several changes in the relative importance of the various types of resins are worth noting. For the first time in many years phenolics have been replaced as the largest-volume synthetic by vinyl resins, and as the largest-volume molding powder by polystyrene. The phenolic resins production figures gave heart palpitations to the most experienced manufacturer. July's production was less than half that of the average monthly rate for the last quarter of the preceding year. However, the last quarter of 1949 found output touching the 1948 average.

Cellulose ester plastics confounded the prophets that have been consigning them to the scrapheap. Instead of continuing to decrease in popularity, the last year actually saw a small increase in their production. However, a great deal of profit evaporated with the price decrease that went into effect last March.

The past year also saw the production rate of polyethylene near 50 million pounds per year, adding another important category to the previously mentioned six major resin products. And 50 million pounds per year is only the beginning. One needn't be an irrational enthusiast to suggest that polyethylene, with an almost unlimited raw material supply and a host of still-to-be-exploited uses, may some day replace vinyls as the largest-volume resin.

BETTER BAGS

Converted packaging machines handle polyethylene film, widen plastic's utility.

DU-O-WHITE CO., Chatham, N. J., is manufacturing a household bleach powder that produces hydrogen peroxide when added to water. It's the

POLYETHYLENE BAG: Functional salesman.

first product run on an automatic packaging machine modified from an existing design by Transparent Wrap Machine Corp., Hasbrouck Heights, N. J., to handle roll polyethylene film. This specialty is a good example of the functional and merchandising advantages of polyethylene for packaging.

The bleach is sold in a box holding four polyethylene bags, each containing one ounce of powder—enough for one washing machine or tub of wash. Product name, manufacturer, sales message and directions for use are printed on the transparent polyethylene film in red and blue, standing out in sharp contrast against the white contents of the package. The package is tough (can be dropped without danger of breaking), inert (cellophane became embrittled when tried as container for the bleach), waterproof and moisture-vaporproof so that the contents can't be damaged before use.

Du-O-White liked the package so well it bought a Transwrap. Transparent Wrap's other customers like it too, and the company is filling orders for people in the food, candy, chemical and other industries.

Industrywide Conversion

Transwrap machines are not the only ones that can fabricate bags from roll polyethylene film during the filling operation. Stokes and Smith Co.'s Stokeswrap, Simplex Wrapping Machine Co.'s Simplex, and Bartelt Engineering Co.'s Bartelt have all been converted to handle the plastic film. Conversion on Triangle Package Machinery Co.'s Roto-Pak is being completed, and the converted unit will soon be available.

Either printed or unprinted film can be run. When printed film is used, it is supplied by such film converters as Milprint, Inc., Milwaukee, and Shellmar Products, Mount Vernon, O.

Joint Development

Adaptation of automatic packaging machines to handle flat sheets of film is pretty much the baby of the Du Pont Co., film converters, and machinery manufacturers. When Du Pont made a survey among converters and ink manufacturers early last year to see how its Polythene film was going, it found more interest than actual development. Because of the material's inertness and other special characteristics, there were no satisfactory methods of heat sealing it or adhesives or printing inks for it. Out of cooperative work, however, came commercial inks based on a new ink varnish developed by Du Pont's Polychemicals Department. This resin is being produced in pilot plant facilities, and quantities are limited.

Du Pont also worked out a special process to reduce the static electricity that developed as the film went through rolls and over plates of the early machines. Further joint work with machine manufacturers resulted in suitable heat sealing materials and conditions. The Transwrap, for example, has the heated dies of the sealing surfaces faced with Teflon to prevent polyethylene's sticking to them.

Although Du Pont is the only manufacturer of polyethylene that produces the film (Bakelite, the other maker, sells molding powder to film producers), it is available from other sources. The Visking Corp., one of the largest of these, also has done work

on this problem, and its materials will work on automatic machines. Plax Corp.'s Plaxpax sheeting, too, has proved very successful on Stokes and Smith's machines. Shellmar Products, in addition to converting and printing, manufactures on its own extruding equipment, selling the film under the trade name Shellene. And Irvington Varnish & Insulator Co. has just introduced a complete line of polyethylene extrusions, including the film.

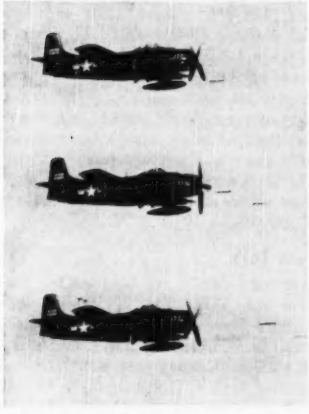
Versatile

With the advantages of polyethylene packaging creating a greater demand among producers of all kinds of materials from candy to metal parts, it is only a matter of time before all wrapping machines will be available for use with polyethylene. In the chemical industry, the new packages fabricated from film are desirable for delicate, corrosive, and hygroscopic chemicals, drugs in small measured packages, and such things as soap powders. Sizes range from 1¼" x 1½" to 5¼" x 13", and from 5 cu. in. to 80 cu. in. by volume.

MICKEYS

ROCKET weapons, with their special chemical propellant and explosive requirements, are assuming increasing importance in the nation's defense arsenal.

Newest such weapon is an air-to-air projectile approximately three inches in diameter, developed by the Navy Bureau of Ordnance. Called the Mighty Mouse, it is the first rocket small enough to be carried in quantity by its mother aircraft, yet fast and powerful enough to destroy a plane with a direct hit.



MIGHTY MICE: Small, fast and nasty.

BEATS DEACON

Indirect electrolytic process makes chlorine cheaply from by-product HCl.

CHLORINE without concomitant production of caustic soda, like raspberry jam without seeds, is a consummation devoutly to be wished. Demand for chlorine continues to soar, while caustic is piling up like cigar butts at an all-night poker session (*CI Newsletter, March 1950*).

A possible path out of this impasse was blazed by Frank S. Low, Westvaco Chemical Division of Food Machinery and Chemical Corp., and presented by the same firm's Charles P. Roberts to the recent Houston meeting of the American Institute of Chemical Engineers. He described a pilot unit for a process that makes chlorine from by-product hydrogen chloride without the inherent disadvantages of either the Deacon process (direct oxidation by air) or direct electrolysis.

The new process involves electrolysis of cupric chloride, liberating chlorine at the anode and forming cuprous chloride at the cathode. The latter is then oxidized by air in the presence of HCl to cupric chloride, which returns to the cell. Other polyvalent-metal chlorides can be used—and have been used catalytically in other chlorine processes (*CI, Sept. 1948, p. 371*)—but copper seems to have the best characteristics for this reaction.

Deacon's Drawbacks

Writing out the two reactions and combining them will prove that the over-all reaction is the same as that occurring in the Deacon process. Why the copper chloride then?

First of all, the Deacon process requires high temperature. Then, because the reaction is reversible, a large excess of air (or oxygen) is necessary to drive the reaction "to the right", i.e., toward more chlorine. (At 450° C., with a 100% excess of oxygen, the reaction is only 75% complete.) Thus the product is of low quality and extensive recycling is necessary. Development of tonnage oxygen has made it possible to get a less dilute product, but this alone isn't enough to make the Deacon process a desirable alternative, for a Deacon plant wouldn't be large enough to warrant an oxygen plant.

Direct Electrolysis Better, But . . .

Many of Deacon's drawbacks are overcome by direct electrolysis of hydrogen chloride. Substantially pure chlorine is obtained at a moderate temperature in relatively simple equipment.

FRANK S. LOW: Copper makes it easier.

But new problems arise to plague the operator: Materials of construction—especially of the cathode—are a serious problem. The high overvoltage of hydrogen on graphite rules out the latter as a practical cathode material, and expensive silver is the likeliest alternative.

Also, the anode and cathode compartments must be separated by a diaphragm, which is exposed to drastic oxidizing and reducing conditions. No material tried so far is entirely satisfactory. A closely-woven glass cloth was the best, but it lost 45% of its weight in 21 days' operation.

Ergo: The New Process

Some time ago Low pointed out to Westvaco the possibility of avoiding the difficulties of direct hydrolysis by recourse to an indirect method, and the present pilot unit is the fruit borne of that idea.*

Although it is chemically equivalent to the Deacon reaction, the metallic chloride process has the advantage of producing chlorine in a very pure form. There is no equilibrium mixture to foul things up, and the oxidation with air—since it takes place in a separate step—does not cause dilution of the product with nitrogen.

It has solid advantages over direct hydrolysis, too: Voltage (and therefore power requirement) is lower, and no hydrogen is generated to contaminate the product or, in case of diaphragm failure, create an explosion hazard. Since no second gas is formed, cell construction is simpler and materials are less of a problem.

Electrolysis Step

It was found that graphite was suitable for both anode and cathode. (Since no hydrogen is formed, overvoltage is no problem as it is in the direct process.) Electrodes looked the same, weighed the same, and had the same

* Pertinent patents granted to F. S. Low are U. S. Nos. 2,468,766 and 2,470,073; Brit. No. 611,908; Can. Nos. 458,795 and 458,796.

water displacement, conductivity, and voltage characteristics after six months' operation as when they were new.

It was first thought that a diaphragm would be necessary to separate the anode and cathode compartments. However a porous graphite cathode through which the electrolyte flows was found to effectively prevent reversal of the electrolytic reaction. A current efficiency up to 90% can be obtained, and elimination of a diaphragm simplifies cell design and lowers the voltage drop.

About a third of the cupric chloride is reduced per pass. Initial electrolyte composition: 15% cupric chloride, 20% hydrogen chloride, 65% water.

Oxidation of Cuprous Chloride

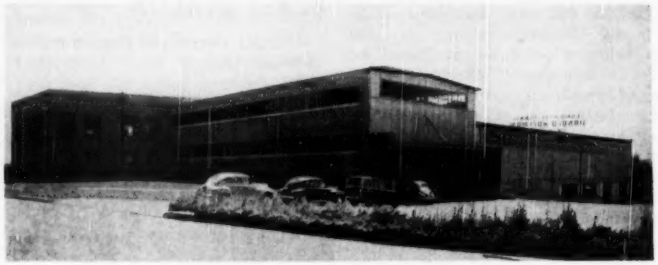
Although air oxidation of cuprous chloride to cupric is rapid in alkaline solution, it is notoriously slow under the acid conditions encountered in this process. Many means of introducing air were tried, but the best type of equipment proved to be a turbine-type gas disperser. Air is simply blown through the spent electrolytic solution until the cuprous chloride is reoxidized. Provision must be made for recovery of HCl blown out with the air and removal of the water of reaction to avoid progressive dilution of the electrolyte.

Plant Designed

These requirements have been embodied in a 4000-amp. cell that produces 230 lbs. of chlorine per day. Measuring 19″ x 19″ x 47″, this is an extremely compact chlorine unit. Operating at a current density of 400 amp. per sq. ft. of cathode, the cell requires 0.8 KWH per lb. of chlorine. The usual caustic-chlorine cell operates at 70 amp. per sq. ft. and takes 1.3 KWH per lb. of chlorine. (The direct process, operating at 100 amp. per sq. ft., also requires 0.8 KWH per lb. It can't operate at 400 amp. If the new process is operated at the lower, less desirable density of 100 amp., on the other hand, the power requirement is reduced to 0.4 KWH per lb. of chlorine.)

A 35-ton-a-day plant has been outlined that requires 310 cells, a series of five oxidizers and suitable recovery and purification auxiliaries.

While no attempt was made to set a production cost per ton—since it would vary a great deal depending on plant location—Roberts asserts that where by-product HCl is available, where power is cheap and labor costs are average, where customers are clamoring for chlorine and shaking their heads to caustic soda, "the copper chloride process is believed to be the most economical method known."



AHCO AT CHARLOTTE: A springboard.

WESTWARD THE COURSE OF EMPIRE...

Imperial Chemical Industries, Ltd., buys century-old Arnold, Hoffman & Co. as base for U. S. manufacturing and selling operations.

BRITAIN'S big Imperial Chemical Industries, largest European chemical maker, regards the United States as still a land of opportunity.

This month, in fulfillment of an offer made in February, it purchased 70% of the common stock of Arnold, Hoffman & Co., Inc., long-established Providence, R. I., chemical manufacturer and distributor, and announced its intention to use the newly-acquired property as a nucleus for expanding its operations in this country.

Made to Order

ICI's previous activities here have been limited to a small sales and purchasing subsidiary, Imperial Chemical Industries (New York) Ltd.

Behind the Arnold, Hoffman acquisition lies a desire by ICI to tap a bigger part of the lucrative American market for chemicals. In the words of its secretary, R. A. Lynex, ICI "wishes to enter into the manufacture of dyestuffs and other synthetic organic chemicals in the United States and to have a medium through which dyestuffs and auxiliary products manufactured by it in England can be readily marketed in the United States." It is perhaps unnecessary to add that the recent devaluation of the pound sterling has accentuated ICI's feelings in this direction.

In Arnold, Hoffman, ICI gets a ready-made outlet for some of its more important products, notably dyes and other textile chemicals. It also gets a small but diversified manufacturing and research organization from which it can build in any of several directions.

In fact, one of the important elements in the acquisition agreement is a plan to develop close technical collaboration between the two companies. ICI in its original offer stated its intention both to make available to Arnold, Hoffman its patents and processes which cover the production and use of dyestuffs, intermediates and certain other organic chemical products and to give general technical advice and assistance to Arnold, Hoffman in that field.

Growth An Objective

"It is hoped, too," said Mr. Lynex, "that it may be possible in course of time to extend the scope of the proposed technical collaboration to other fields of technology, thus broadening the base of Arnold, Hoffman's activities." A,H president Edwin H. Arnold is particularly enthusiastic about that prospect of the new union. "It is quite obvious," he believes, "that expansion is on the horizon."

The rest of Arnold, Hoffman's previous owners also have reason to be happy about the deal. For its 70% slice of their 93,000 shares of stock, ICI paid $55 a share. Net earnings per share in 1949 were $1.93, against $3.00 in 1948. Considering what happened to the textile industry last year, that is far from bad; but what probably impressed the purchasers more was the company's remarkable postwar sales growth: From a volume of about $2,750,000 in 1944, sales almost tripled over the next four years to a record $7,239,000 in 1948.

Since 1815

It was only three years after the War of 1812 that Benjamin and Charles Dyer of Providence founded the little company for the distribution of medicinal drugs that was later to become Arnold, Hoffman & Co. What reaction even the suggestion of sale of their hard-built business to the

British would have evoked from those early American gentlemen is not hard to imagine.

But today is another day. The present company was incorporated from its line of predecessor companies in 1900 under the leadership of famed chemical pioneer Edward E. Arnold, the same Arnold who eight years previously had helped found Mathieson Alkali Works, became its first president. (The white-paneled offices where Mathieson directors used to meet now provides laboratory space for Arnold, Hoffman research chemists.)

The company confined itself almost entirely to textile chemicals until 1937,

EDWIN H. ARNOLD: Expansion is on the horizon.

but in that year a diversification program was launched which resulted not only in the sales spurt already mentioned but in 1947 found Arnold, Hoffman customers in virtually every important industry.

Today the company maintains three manufacturing plants in addition to its Providence headquarters. At Dighton, Mass., it makes dyes, wetting agents, dextrins and sizes. In Cincinnati it makes fat derivatives such as red oil, stearic acid and crude glycerine in the former Harkness and Cowing Co. plant which it acquired in 1948. The newest facility, built in 1947, is at Charlotte, N. C., where the company makes and stocks a variety of products for the southern textile trade. Research is carried on at Providence, Dighton and Cincinnati.

No Surprise

In Arnold, Hoffman & Co., ICI no doubt has a good springboard for entrance into U. S. textile and other chemical markets. At the present point in the economic cycle, U. S. producers may not particularly welcome increased competition from abroad. But to most of them it will not come as a total surprise. There have been signs for some time of a determined effort by the British to improve their export-import balance—an ambition for which we can hardly blame them—and the acquisition of Arnold, Hoffman may help.

LESPEDEZA LUCK

Important Southern forage crop may become valuable drying oil source.

BECAUSE the Southern summer sun is hot and searing, lespedeza—which grows best in July and August when other pasture crops fail—has become as indispensable on the range-lot as fatback and corn pone on the supper table. In one state alone, North Carolina, the seed crop amounts to some 30 to 40 million lbs. a year.

But Southern farmers may have an unrecognized bonus in the barn. Richard H. Wiley, formerly at the University of North Carolina and now head of the chemistry department at the University of Louisville, has studied solvent-extracted lespedeza seed oil, reports that it is a semi-drying oil comparable to soybean oil. Preliminary data on its properties are as follows:

Property	*Value*
Iodine number	147.2
Acid number	21.0
Saponification number	149.0
Unsaponifiables (%)	5.6
Drying time (with drier) (hrs.)	4.75

Wiley is currently working on characterization of oil from different varieties of lespedeza. These studies indicate that the above data will probably be revised toward a higher saponification number, in line with most vegetable oils, and a higher iodine number.

RICHARD H. WILEY: Bonus in the barn.

Short-Term Outlook Poor

The problem of costs is standing in the way of commercialization right now. The current drop in oil prices has been so drastic that governmental and industrial researchers are more worried about new markets for old oils than about developing new oils.

Average seed yields of the Korean strain run about 200 lbs. an acre, but 500-lb. yields are not unusual. Another strain, Sericea, has yielded 800-1000 lbs. It must be remembered that extensive cultural studies aimed at improving seed yields are lacking.

Assuming a yield of 500 lbs. per acre, $10 per acre harvesting cost, and a 10% yield of oil from the seed, cost of the oil, exclusive of extraction, is 20¢ a lb. Linseed oil, on the other hand, is currently selling for 18¢.

Future Better

But Wiley is optimistic where the long-range view is concerned.

Flax (linseed oil) is a subsidized crop, for farmers are loath to grow it. Lespedeza, on the other hand, is a readily accepted crop in the South, and one likely to be grown more and more extensively. Wiley thinks that once a research and development program gets under way, Southern agriculturists who are now indifferent as a result of current low oil prices will get excited about the long-term prospects.

CAUSTICIZED CATHAY

LARGE EXPORTS of caustic soda sent a short-lived smile flitting across the face of an otherwise dejected industry as 1949 drew to a close.

Thanks to the entry of Chinese communists, funds which had been blocked by the Chinese nationalists were released. Using these funds, traders, principally in Hong Kong, purchased an estimated 35,000 tons of caustic soda in about three months. This was more, however, than Hong Kong could digest and the Chinese went out of the market as fast as they had entered, erasing the smiles of those producers whose inventories were being pared. At present an attempt is being made to transfer the material from Hong Kong to the North of China by blockade runners.

What's new

GERMICIDAL GOLD RUSH

Trend to bactericidal soaps hits upsurge as new products for industrial sanitation and "B. O." protection reach market.

THIS MONTH the soap industry, shaking off a blasé demeanor born of recent history when every day saw the introduction of a new synthetic detergent, is again excited about a new kind of product. Two new deodorant bar soaps have just about achieved national distribution, a new liquid germicidal soap is being introduced to the industrial and institutional trade, and every manufacturer is either working on a bactericidal soap or has his competitors thinking he is.

All of these new products are based on Givaudan-Delawanna Inc.'s germicide hexachlorophene. Hexachlorophene is the generic name adopted by the American Medical Association for the chlorinated phenol, *bis*(3,5,6-trichloro - 2 - hydroxyphenyl)methane, which is sold as G-11 through the Sindar Corp., Givaudan-Delawanna's wholly-owned subsidiary. It is made by condensing two molecules of 2,4,5-trichlorophenol with one of formaldehyde.

Ewing Galloway

DEODORANT SOAP: Everyone wants to get into the act.

Better than Carbolic

G-11 was developed by William S. Gump of Givaudan in a search for germicidal agents that would retain a large part of their bactericidal activity when incorporated with excess soap. Phenolics, which are common disinfectants, are not effective in soaps since alkali salts are probably formed, although products so formulated have been widely advertised and sold for body odor control. Gump's work led him to a group of diphenols which did not lose their antiseptic activity in presence of excess soap—in part, at least, because only one of the hydroxyls of the molecule reacts to form a salt, leaving the other free. G-11 was one of these new materials found suitable for use in germicidal soaps and the one on which the bulk of experimental and development work has been done.

It is easily added to soap during manufacture—either as such or as the monosodium salt in powder form or as an acetone or alcohol concentrate. In preparing liquid soaps, an acetone solution is used. Incorporation of two percent of G-11 in ordinary bar soap gives a non-irritating and relatively non-toxic product that reduces the bacterial flora of the skin considerably if used regularly. Such soaps are valuable in surgical scrubbing; around restaurants, other food handling establishments, hospitals, etc., where communication of disease is of special concern; in industrial plants to cut down on infections and dermatitis; and for general antiseptic use wherever desired.

On The Industrial Front

Latest of the hexachlorophene-containing soaps is West Disinfecting Co.'s Antiseptic Soap, a liquid product that is just being introduced to its customers in the institutional and industrial field. The manufacturer suggests that personnel wash their hands five days a week several times a day, avoiding intermittent use of other soaps, to achieve maximum antiseptic effectiveness through the cumulative action of the hexachlorophene. Another "plus" is built into the soap: It contains lecithin, an emollient to eliminate the drying out effect of repeated washing. This is expected to have particular appeal to those whose jobs have necessitated prolonged scrubbing followed by a strong germicidal rinse.

Another product containing G-11 that is designed for special distribution is Winthrop-Stearns' pHisoderm-hexachlorophene 3%, a pre-operative scrub for surgeons and nurses that was brought out about a year ago. This combination of pHisoderm (detergent emulsion of an ether sulfonate, lanolin cholesterols and petrolatum having the same pH as the skin) and 3% hexachlorophene is recommended as a two-minute scrub to replace the long wash-up common in the medical profession.

The Retail Scene

As might be expected, promotion of germicidal soaps has taken a different tack on the consumer level. Here bar soaps are being sold for protection against odor-producing skin bacteria. Armour's Dial, which is advertised as giving "round-the-clock freshness" through AT-7 (its name for G-11), was the first to challenge Lifebuoy, which was being sold for "B. O." long before hexachlorophene came along.

Under strong advertising support, Lifebuoy has held a large share of the toilet soap market, particularly bath soap. However, Dial has been able to make an appreciable dent in some markets, gaining as much as two to four per cent of sales. In the 1949 Milwaukee Journal analysis of the greater Milwaukee area, Dial, which is listed as a new product, was tenth in sales of bath soap with 1.1% of sales; Lifebuoy was third with 18.6%.

Since the first of the year, three others have moved into the field: Hewitt Soap Co., a P & G subsidiary, with Chex; Packers Tar Soap Inc., Mystic, Conn., with its Charm Deodorant Soap, and the Pharma Craft Corp., New York, with Fresh deodorant soap. Introduced initially in top markets, the latter two products now have practically national distribution; Chex distribution is still confined to some Midwest markets and Upper New York state.

Two Bits a Bar

All of the new deodorant soaps sell for twenty-five cents a bar, a price which will probably restrict the market somewhat. Apparently the success of Dial, selling in competition with conventionally-priced Lifebuoy, has, however, bolstered the hopes of other manufacturers.

The resultant clamor for G-11 has swamped the Givaudan organization, which holds patents on the compound and soap formulations of it. Reportedly Armour has been taking most of the company's production, and Gillette, which incorporates it—as K-34—in its shaving cream (*CI Newsletter, Nov. 1948*), is a good customer. Undoubtedly the company will be happy to expand production when and if it is sure of the size of the eventual market. At this point, the fever in the soap industry is running high enough to indicate that soapers think there's a rich strike to be exploited, and everyone wants to stake a claim.

INTERNAL FIRE

Autothermic ethylene process burns part of feed stock internally to yield necessary heat.

CRACKING of ethane or propane to ethylene requires heat. Burning ethane and propane, on the other hand, is an excellent way of producing heat. Why not do both at the same time and in the same place (*in situ*, as the purists say) and by-pass the disadvantages of an externally heated tubular reactor?

That's the question Universal Oil Products Co. asked; and autothermic cracking, described before the American Institute of Chemical Engineers at Houston recently by UOP's R. M. Deanesly, is its answer.

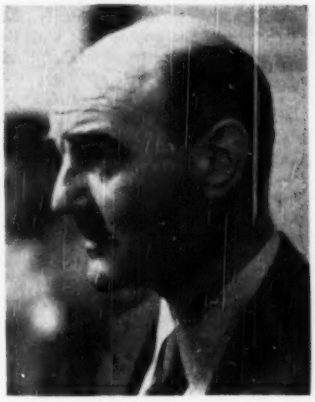
The broad idea in one form or another isn't new: Indeed, it is already used to make gasoline, fuel gas, acetylene, and other hydrocarbons. But UOP claims to have a workable process for making ethylene that way—and its workability distinguishes this process from its predecessors. I. G. Farben made ethylene from ethane and oxygen autothermically during the war, but the use of oxygen and reduced pressure (½ atm.)—both sidestepped by UOP—made the process expensive and complicated.

All Is Not Gold

The general principle of autothermic cracking is patently simple: The feed stock is mixed with enough air so that combustion of part of the feed produces enough heat to crack the rest of it. The heat content of the red-hot product gases is utilized in a heat exchanger to preheat the entering air and feed stock.

Such a process has obvious—and some not so obvious—advantages: The necessary high temperature is internally generated in simple insulated reactors, and there is no need to transfer heat through the reactor wall. Higher temperatures are thus obtainable, allowing shorter residence time (hence greater throughput or smaller reactors) and higher conversion per pass. Dilute feeds containing as little as 50% ethane can be used satisfactorily. Heavier feed stocks (propane, butane, etc.) give C_2 cuts containing 92-94% ethylene as against 75-80% in tubular furnaces.

Also, the process works well with ethane, the most economical feed stock, even if it contains methane. Tubular furnaces require essentially methane-free ethane, and cracking conditions are so severe that capital and maintenance costs are high.



R. M. DEANESLY: It's hot inside.

There are disadvantages, too: The product is diluted with nitrogen, products of combustion (carbon monoxide, carbon dioxide, water) and traces of oxygenated products—aldehydes and acids—all of which constitute a nuisance.

Approaching the Ideal

It is interesting and instructive to compare the process that exists with the ideal process that will always remain only a pleasant dream. In the ideal process pure ethane and oxygen would react to give ethylene and water, liberating heat. Absorption of all this heat energy by additional ethane would split the latter into ethylene and hydrogen. The heat balance works out so that one mol of oxygen would yield 3.448 mols of ethylene. No oxides of carbon, no aldehydes or acids, no methane or other hydrocarbons!

It is quite remarkable that the practical process—where several concurrent reactions take place and some heat energy is bound to be lost—can give over half the theoretical yield of ethylene from ethane.

No Oxygen, No Vacuum

The Germans used oxygen instead of air and operated at reduced pressure; UOP saw no need to adopt either. Although Le Chatelier's principle shows that pressure suppresses the formation of ethylene and hydrogen from ethane, UOP found that the difference in yield in going to reduced pressure is less than the analytical error.

In a large plant it's fifty-fifty whether or not to use oxygen and save on ethylene recovery. (With air the product gases contain some 30% nitrogen.) But its economic use wanes as thermochemical efficiency of the process waxes—and UOP is moving in the direction of greater efficiency. As it stands now ethylene content of the raw product gases—even with all the nitrogen and products of combustion—is just about as high as that from tubular reactors, so recovery and concentration costs are roughly the same.

So far the process has gone only through the pilot plant. Designs have been made for full-scale plants, however.

LATH CONTACTOR

New shaped-metal lath tower packing promises savings over conventional bubble caps.

DESPITE onslaughts from various types of tower packings and new tray designs, the conventional bubble cap tray has remained "king of the hill" for liquid-vapor contacting apparatus—partly because designers know how bubble caps will perform and partly because of the difficulty in achieving good liquid distribution across the diameter of the tower when using conventional tower packings.

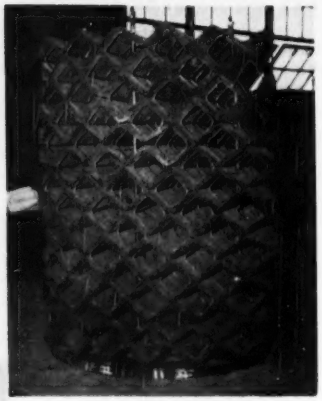
Strong competition is promised, however, by "Panapak", a new multiple-layer expanded wire lath packing developed by the Pan American Refining Corp. R. C. Schofield is the inventor (U.S.P. 2,470,652), and Marshall-Moorman Development Co. of New York is the technical and licensing agent.

Two years' experimental operation of commercial towers packed with "Panapak", first described before the American Institute of Chemical Engineers at Pittsburgh, Pa., indicate both an increase in contacting efficiency and, under certain conditions at least, twice the capacity per unit of volume of a conventional bubble-cap column.

Construction

Panapak was designed to achieve uniformity of liquid distribution by use of a tray, formed by compacting a number of layers of metal lath, bent into a zig-zag shape. Seven layers of lath are used.

The trays formed by this operation were placed in a tower with the "zigs" of one tray touching the "zags" of the tray below, and the "zags" touching the "zigs" of the tray above. This combination forms a honeycomb-like assembly in which the liquid flows down two adjacent slopes, meets at the bottom, redivides on the next slope and thus on to the bottom of the tower. This redivision prevents the channeling of the



PANAPAK: No channeling.

downcoming liquid stream—bane of all designers who must use packed towers.

The seven layers of lath are tacked together and trimmed to the desired radius, formed into a small diameter roll, and inserted into the tower through a manhole. Release of the ties holding the roll permits the tray to spring back to its original shape without distortion.

In the tower the packing is supported on a grid which also anchors the bolts extending through the layers of packing and holding it in place. Fibrous asbestos, tamped into place between the tower wall and the outside of the packing prevents channeling of the liquid between tower wall and packing.

Fine non-adhesive suspended matter will pass through Panapak under conditions that would normally clog bubble trays. However, when it becomes necessary to remove the packing for cleaning, Panapak can be removed, sand-blasted, and reinstalled in about the time normally required to clean a bubble tray.

Commercial Applications

Panapak has been used in two commercial installations at the Pan American refinery at Texas City, Texas. One was in an eighteen-inch diameter virgin oil stripper, which was employed alternately for topping crude and asphalt production. After 18 months' service no fouling was found in spite of the fact that in the asphalt operation the stripper charge was dirty.

In the second application Panapak replaced a four-foot diameter tower with bubble cap trays on 2.5′ spacing in a heavy virgin gas oil stripper at a thermal cracking unit. Because of the high production required from this tower the product from the original column had been of poor quality. Replacement of the bubble caps with the new packing has restored product quality to the desired level.

The new packing is suitable for commercial fractionators ranging from a diameter of two feet to unlimited diameters. Performance and cost advantages are greatest from near atmospheric pressure to about 75 psia. Its advantages decrease at either higher pressures or vacuums.

The packing should be considered for superfractionation, i.e., separations requiring more than one bubble-cap tower in series. Its use would permit replacement of three towers, 8′ diameter, 1.5′ tray spacing, and 65 trays per tower, with a single 6′ diameter packed tower of the same height as a single bubble tower. Corresponding savings in auxiliary costs would also be realized.

Another important application may be substitution for bubble caps in existing towers to provide increased capacity with a minimum of new capital expenditure.

KENYA KAPUT?

Carbide first to produce "synthetic pyrethrum" in commercial quantities.

"COMMERCIALIZATION is at least five years away." That was the reaction of the chemical industry in March 1949 when U.S. Department of Agriculture workers F. B. La Forge, M. S. Schechter and N. Green made public their synthesis of pyrethrin-like esters with insecticidal properties almost identical to those of the natural product.

Last month, Carbide and Carbon Chemicals Division of Union Carbide and Carbon Corp. proved that last year's estimate of the minimum time required for the laboratory-to-plant hurdle belonged in the clouded-crystal-ball file. It had produced the allyl homolog of Cinerin I (one of the four insecticidal components of natural pyrethrum) in multi-ton quantities (*CI Newsletter, February 1950*) and was making it available through such companies as S. B. Penick & Co., John Powell & Co. and McLaughlin Gormley King Co.

Feeling justly proud of its accomplishment, Carbide tossed a party at the Boyce Thompson Institute, Yonkers, N.Y. (where the company supports cooperative research on effect of chemicals on insects, fungi and plants) to tell the insecticidal world about the new material. On display were 55-gallon drums of the chemical that previously had been available in minute quantities. A series of tests demonstrated that formulations of allyl cinerin are as potent as those of natural pyrethrins against flies and German roaches. U.S.D.A. officials, on hand to receive plaudits for their initial discovery and further cooperation in the development, turned the birthday party into a christening by revealing a new name for the unwieldy *allyl homolog of Cinerin I*: allethrin.

Materials, Know-How

Although the material's name was simplified by juggling a few syllables, the commercial process still looks as complicated as the laboratory preparation. Twelve different steps are involved and eleven different intermediates must be processed. In addition, a large bulk of materials must be handled—200 pounds of chemicals to produce one pound of allethrin.*

Formidable as the job seemed, Carbide was in a good position to take it on. The company either was making the raw materials already or knew how to make those not available. (It buys only glycine, methallyl chloride, allyl chloride and diethyl carbonate.) It had plant facilities for small commercial-scale production of organic intermediates that could be scheduled for the new material. And its manu-

* Chemically, allethrin is DL-2-allyl-3-methyl-cyclopenten-1-one ester of DL-*cis trans*-2,2-dimethyl-3-(2-methyl propenyl) cyclopropanecarboxylic acid. The acid portion of the molecule is formed from 2,5-dimethyl-2,4-hexadiene and diazoacetic ester, neither of which was available on a commercial scale a year ago. Carbide makes the former from methallyl chloride, the latter from glycine. The rest of the molecule is a cyclopentenolone. Its preparation involves the reaction of ethyl acetoacetate and allyl chloride to yield allyl acetone. This and diethyl carbonate form ethyl 3-keto-6-heptenoate, which is condensed with pyruvic aldehyde giving 3-hydroxy-8-nonen-2,5-dione. This hydroxydiketone is cyclized to 2-allyl-3-methyl-2-cyclopenten-4-ol-1-one.

ALLETHRIN: Carbide's chrysanthemum.

facturing experience with high-boiling esters sold as plasticizers was just what was required in this synthesis.

Knockdown's Not Synthetic

In insecticidal properties, experimental work done so far shows very little difference between allethrin and natural pyrethrins. On houseflies, commercial allethrin is fully equivalent to laboratory allethrin and natural pyrethrins in knockdown and kill, and has markedly superior residual activity. Although the new insecticide is about as good as pyrethrins against German roaches, it is not so effective against American roaches. There is evidence, however, that with proper synergists, this shortcoming may be overcome.

Since in most aerosol formulas, pyrethrins (quick knockdown) are generally used in combination with DDT (high kill and residual action), the efficacy of allethrin-DDT formulations is significant. What work has been done in investigating that problem indicates that they are almost as good as pyrethrins-DDT.

Carbide reports that allethrins can be bolstered with synergists to the same extent as pyrethrins, and its data with *n*-propyl isome and piperonyl butoxide as synergists show comparable improvement in insecticidal properties of synergized allethrin and pyrethrins over pyrethrins alone.

Pyrethrum is outstanding in its low toxicity to higher animals, and allethrin is expected to show the same characteristic. Studies made thus far on the new material are quite encouraging, and all indications point to its being as harmless as the natural material.

The government has granted Carbide permission to ship allethrin as an insecticidal concentrate, but has not yet approved labels of finished insecticides containing the new chemical. In less than six weeks, however, commercial insecticides incorporating it will be on the market, for Federal authorities probably would not have approved labels for the concentrate if they were not going to be receptive to applications for labels on finished formulations. These will be limited to sprays for the time being, since use in aerosols is awaiting completion of inhalation tests.

Stable Price for Pyrethrins

Comparison of allethrin's insecticidal activity with that of pyrethrins is only half the story to price-conscious manufacturers. Although Carbide has not stated the price, vice president Harry B. McClure describes it as being competitive with the natural material. (Actually it will sell at 10-15% below the price of the natural.)

One immediate effect will be to stabilize the price of pyrethrum (*Chrysanthemum cinerariaefolium*) flowers which are imported principally from Kenya Colony, the Belgian Congo, Brazil and Japan and extracted here to make insecticidal concentrates. Kenya flowers in the last 18 months have climbed from 32 cents a pound to about 40 cents. Insecticide formulators who buy about 150,000 pounds of relatively high-priced pyrethrins a year (20% concentrate for aerosols now selling at $11-11.50 a pound), will welcome a new market factor independent of natural hazards and foreign controls. If allethrin follows the pattern of other new organic chemicals, its price should go down with increased volume and process improvements. That might put such a low ceiling on the natural material that importing it would no longer be economically sound.

More important, it will give an assured supply of the only insecticidal chemical allocated by the Allied Command during the last war when pyrethrins were needed to control insects carrying malaria and typhus. About 7,000 tons of flowers were flown in during the war to provide about 80 tons of active insecticide (flowers currently imported average 1.2% pyrethrins). The extract is now being stockpiled to guard against future cut-offs from supply.

HARDWOOD MADE EASY

New chemical process converts hardwood to pulp at lower cost than spruce.

NEW ENGLAND'S softwood stands have been depleted by years of pulping, but there's still a lot of hardwood. Throughout the country in fact, a third of the timber is hardwood, but only an eighth of the pulp is made from it, and its proportion is thus constantly increasing.

That's why there was a lot of interest in a new hardwood pulping process, described to the Technical Association of the Pulp and Paper Industry in New York recently by C. Earl Libby and Frederic W. O'Neil, professors at N. Y. State College of Forestry, Syracuse.

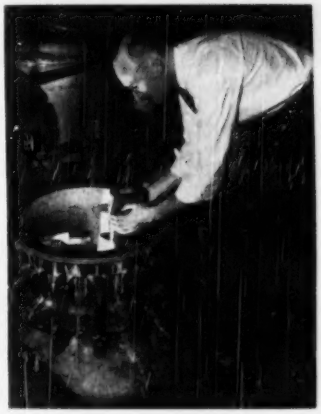
Chemical Cook

Key to the process is a chemical cook of the logs before grinding. Four-foot logs are put in a digester and cooked for 6 hours in a solution (1½ lb./gal.) of sodium sulfite and a minor amount of sodium bicarbonate. Vacuum at first and pressure (200 psi) afterwards increases penetration of the liquor into the wood. Temperature of the cook is about 150° C.

Storage of the wood for several hours after cooking speeds grinding and produces a stronger pulp.

Four factors combine to bring the cost below that of spruce pulp: power requirements are 40% lower, production rate from the same equipment is 20-30% higher, 25% more pulp is obtained per cord, and the wood is 30% cheaper in the first place. Pulp yield is in the mechanical pulp range—i.e., over 90%—as against 60-70% for semi-chemical hardwood pulping.

While the "chemigroundwood" process, as it is called, may permit



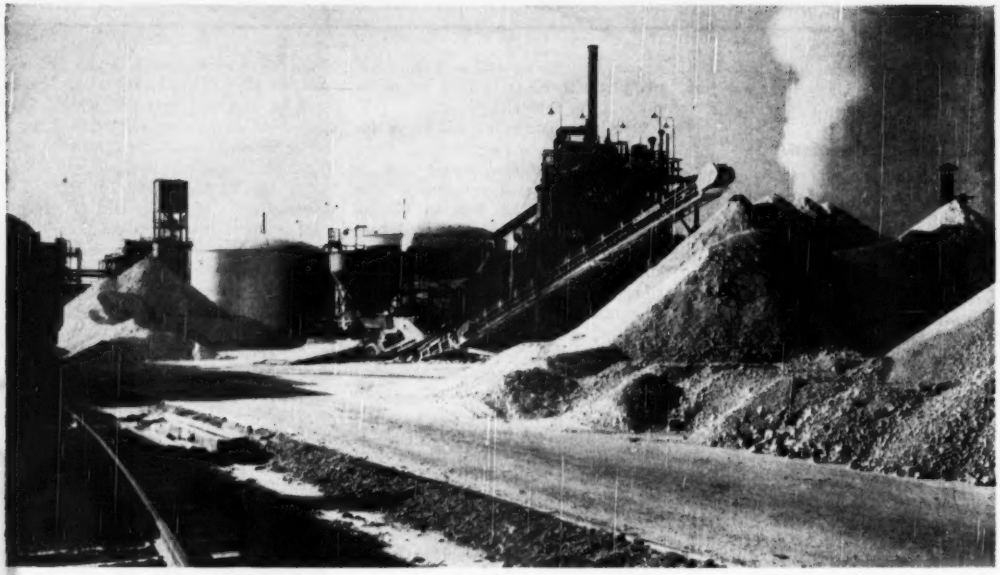
F. W. O'NEIL: Sulfite soaking makes it work.

profitable use of waste hardwood on marginal lands, conservation measures will probably prevent a shortage of the easier-pulped softwoods. Another drawback is that hardwoods deteriorate in water when they're floated down rivers to paper mills.

Nevertheless, chemigroundwood pulp can be substituted for spruce mechanical pulp in most grades of paper, and use of hardwoods in some areas—particularly in New England—may be economically sound.

Libby and O'Neil's research is sponsored jointly by New York State and a group of 14 paper mills in this country and Canada.

TO MEET emergency fuel gas needs during cold snaps, R. M. Deanesly, of UOP (*see p. 505*), advocates autothermic cracking of easily-stored propane. Equipment for conversion can be built at low capital cost.



Sulfuric acid from the contact unit (right) reacts with fluorspar in rotary kilns below the silos (deep left) to form HF.

Good Fume Control Features

New Pennsalt HF Plant

by HERMAN W. ZABEL, Associate Editor

THE first feature to impress a visitor to the new hydrogen fluoride plant of the Pennsylvania Salt Manufacturing Co. at Calvert City, Kentucky, is cleanliness. Most HF plants are rather dreary places as even the minute amounts of HF which escape to the atmosphere have a harmful effect on the surrounding vegetation. But grass still grows at Calvert City.

The new $2,000,000 plant, which went onstream last July, is on a 540-acre site on the banks of the Tennessee River near its junction with the Ohio. This large acreage was purchased with a view to possible further expansion. Guarding against the possibility that fumes might escape and destroy some vegetation, the management did not rent the excess acreage for farming last year. Use of reduced pressure in all HF-bearing process equipment and thorough scrubbing with water has controlled fumes so successfully, however, that rental of this land is contemplated this year.

RAW MATERIALS

Other than the cooling water and air, the only raw materials entering the plant are fluorspar concentrates (about 98.5% CaF_2), sulfur, which comes to the plant site by barge from the Grand Ecaille dome in Louisiana, and lime. Pennsalt has its own fluorspar deposits about twenty miles from the plant in Kentucky. However, at present concentrates are purchased on the open market. These concentrates, analyzing about 98.5% CaF_2, are produced by flotation from the crude spar, analyzing 40-60% CaF_2.

The cooling water which is obtained from the adjacent Tennessee River has about 95 ppm total solids and is used after clarification and softening with zeolite for boiler feed water. Potable water is produced by clarifying and chlorinating well water with an Infilco "Accelator."

Local labor is used throughout. The engineering staff first trained the operators and plant operation was gradually turned over to them. The total staff required is about 50.

THE PLANT

The plant, which is of outdoor construction throughout, may be divided into two major parts: a standard 100-ton-a-day Leonard-Monsanto sulfuric acid plant and the plant for production of HF from fluorspar and sulfuric acid. Although TVA power is cheap, steam turbine drives are employed at numerous locations throughout the plant to utilize as much of the 300-psi steam from the waste heat boiler in the sulfuric acid plant as possible. Even so, only about 65% of the available steam is now used. A standby, oil-fired, 8,000 lb./hr. automatic

steam boiler provides steam for start-ups.

The acid plant converts 97.5% of the entering sulfur to 99% sulfuric acid and is so designed that 20% oleum can also be produced when needed. The entering air for sulfur oxidation is compressed by an Elliott turbo blower and dried with 98% acid. The water absorbed in this step of the process provides a portion of the total requirements for sulfuric acid formation, the balance being supplied from the plant potable water surface.

HF PRODUCTION

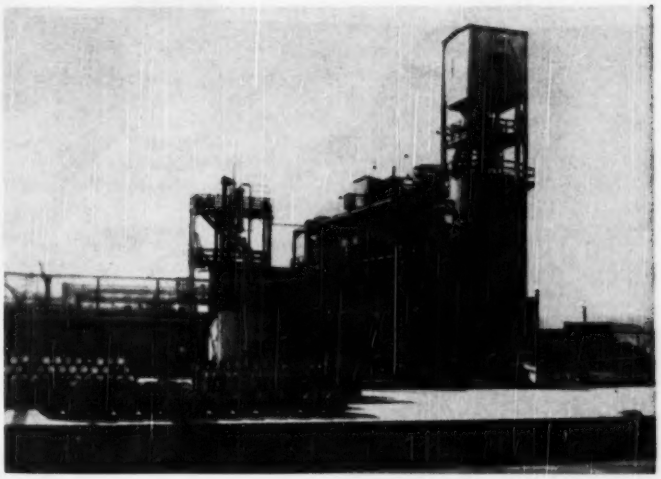
The second portion of the plant, that for the production of HF, is the reason for its existence. Here the fluorspar comes into the plant via a spur track of the Illinois Central Railroad and is moved from hopper cars to a storage hopper via Fuller Airveyor. It then drops from the hopper to three 500-ton storage silos. A fourth silo is provided to hold lime to neutralize the exit acid waste.

The spar drops from the silos by gravity and moves by screw conveyor to the three rotary kilns where the HF is formed by reaction with sulfuric acid which is added through Durimet pipes. The spar feed is regulated by a variable speed drive on a Jeffrey bin valve. The kilns are externally heated with an oil-fired burner to provide close heat control. Replaceable steel liners are now being used in the kilns. However, further tests are planned on other materials of construction.

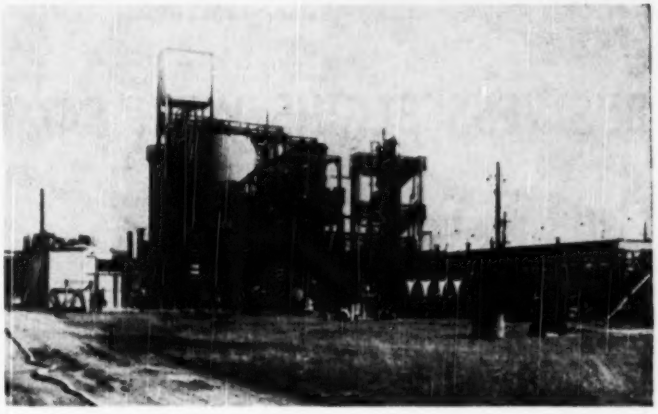
The HF gas from the kilns passes into towers packed with coke. These catch spar dust, entrained sulfuric acid, and some moisture condenses, providing the first cleanup step in HF purification. HF concentration upon leaving these towers is 90-93%, the impurities being principally water and hydrofluosilicic acid. The liquid-dust mixture drops back into the kiln where reaction eventually takes place.

From the coke box the HF-bearing gas passes to a surface cooler. The condensate formed here is a water solution of HF, sulfuric acid, and hydrofluosilicic acid. HF vapor then passes to the final condensers. No further purification of this condensate is made. It is used as the diluent in preparing the various concentrations of hydrofluoric acid to enable storage in steel vessels. The sulfuric acid and hydrofluosilicic acids serve as pacifiers to prevent corrosion of the steel.

The effluent HF from the surface cooler is liquefied by a two-stage steel condenser; the first water-cooled, and the second, brine-cooled. The condensate formed is 95-98% HF diluted with some water and sulfuric acid.



HF is recovered and purified by a series of coolers, condensers and washers. Extensive drum and cylinder loading facilities are required for shipment of the acid and the anhydrous material.



The gas from this condenser is scrubbed with water to absorb the last traces of hydrofluoric and hydrofluosilicic acids. The scrubber effluent is used as the source of water for the 60-70% hydrofluoric acid solutions. Before venting to the atmosphere, the exit gas is scrubbed in a water ejector, which also serves to maintain a small negative pressure on the system. Thus all leakage is inward and no HF or hydrofluosilicic fumes can escape into the atmosphere.

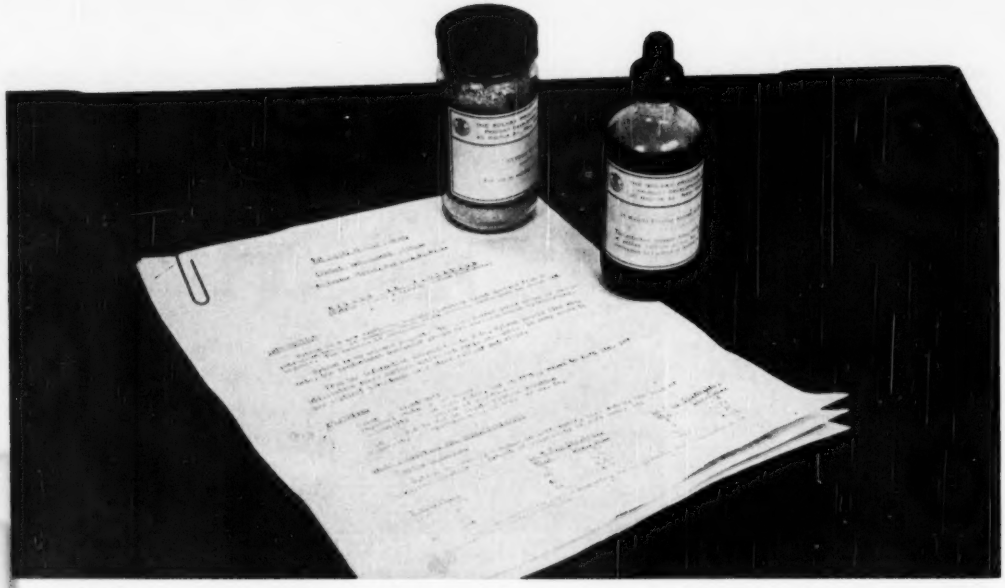
The liquid HF condensate is purified by distillation in a copper bubble cap tower to give a final product whose analysis is over 99% HF. Brine-cooled condensers must be used on top of this column.

WASTE DISPOSAL

The solid effluent from the kilns is principally calcium sulfate and sulfuric acid with small quantities of calcium fluoride. This is slurried with lime to neutralize the acid and the slurry run into the first of two natural lagoons, occupying over 70 acres. Here the solids settle out and the excess water overflows to the second lagoon from which it seeps into the ground.

THE PRODUCTS

At present sulfuric acid, 60% and 65% hydrofluoric acid, and anhydrous HF are being sold. The concentration of the hydrofluoric acid is determined by controlling the temperature of the vessel in which the HF and water or condensate from early stages in its manufacture are mixed. A lower temperature gives a higher acid concentration. This acid is run to storage and from there into steel drums or tank cars as dictated by the customers orders.



MAKE IT EASY for the prospect to use the sample. Here a sample of synthetic detergent for test as a flotation agent is sent out both in the form of a dry powder and as a bottle of solution with a calibrated glass dropper adjusted to standard laboratory flotation cells.

BUSINESS BEGINS WITH SAMPLES

by DOUGLAS H. ROSS*, The Solvay Process Division
Allied Chemical and Dye Corp., New York, N. Y.

Care in preparation and packaging of samples pays off. Multi-million dollar decisions hinge on the results of sample testing.

DURING the past several years we have received hundreds of letters starting, "please send me a sample of . . ." Asking ourselves the question, "What is a 'sample'?" we have arrived at the conclusion that a sample is a single, small, free shipment of a product with specified and fixed chemical and physical properties.

In the chemical industry a sample is usually sent only on request to avoid cluttering a recipient's files and shelves, or waste baskets, with unwanted parcels. In exceptional cases, unique and easily recognized properties of a new chemical justify large scale, unsolicited sample distribution as the most efficient means of introduction. However, subsequent inquiries regarding the use of unsolicited samples are usually unsuccessful.

Samples of products in regular plant production fill an important and well recognized role. The remarks in this article do not relate to this type of sample, but rather to the packaging problems associated with new products not yet in production, but on which market research and product development are under way.

IN MARKET RESEARCH

In a market research program, samples are sent out for technical evaluation after the product has received careful study in the laboratory, its properties are known, and some conclusions have been formed regarding its possible application. At this point a limited number of potential users are asked to confirm or modify the laboratory's own evaluation of the product.

This procedure represents a series of technical screening tests. Assuming these tests are successful, the next step is an active product development program in which samples are widely distributed to feel-out markets or to develop new uses prior to full scale production and sale.

In either case the individual sample shoulders a heavy responsibility. Since it represents years of research and pilot plant operation, the investment alone is substantial. For example, in one case that has come to our attention the research and development outlay was estimated at about $1,190.00 for each pound distributed. But even the hypothetical money value is of secondary importance compared with the primary responsibility of the sample to provide reliable information as a basis for full scale plant construction and operation. Thus, the decision to build a plant worth millions of dollars may rest on the results obtained with a relatively small number of samples.

DETAILS IMPORTANT

Under these circumstances, it is essential to give every detail of a sample careful consideration. The first

* Assistant manager of product development.

concern is for the chemical composition and physical form. Usually it is impractical to send out a large number of samples before the project has reached the pilot plant stage. To do so is to waste everyone's time with premature experiments, or to so hedge about the sample with "if's, and's or but's" that the information obtained is valueless. The exception, of course, is the technical screening test mentioned above. In most cases, it seems safe to wait until the pilot plant stage in order to insure that the samples conform with the standards for full scale commercial production.

Having taken great pains on the research and development of a product up to the point of sample distribution, good judgment dictates that equal care be taken in selecting the package.

Small liquid samples are usually packed in glass bottles of 4-oz. to 8-oz. size with a narrow neck for easy pouring. In addition, many granular or flake samples may be packed in bottles, provided a wide mouthed container is used to allow the use of a spatula or spoon in removing the contents.

Some chemicals are highly sensitive to sunlight and will require a colored glass, either brown or green, for proper protection. Other chemicals are good solvents, or are corrosive and require extra precautions in selecting the proper container. No matter how good the original sample may be, it is useless if it reaches its destination with the cap corroded beyond removal, or with part of the liner dissolved and contaminating a once-pure liquid.

For shipments in glass, the bottle, the protective wrapping, and the cardboard shipping tube or carton should be considered as a unit. The cardboard carton must provide proper shipping protection, and in addition it must be neat and compact. In many cases standard cartons of proper dimensions will be available, but if they are not, custom-made shipping cartons with the correct dimensions are worth the added expense.

Emotions are an important factor to consider in a scientific sampling campaign. For example, in consumer acceptance tests with detergents it should be remembered that the average housewife is accustomed to a standardized package. Millions of advertising dollars have been spent to achieve this consciousness. Therefore, if a sample is displeasing because of its size, shape, color, weight or feel, a critical evaluation of the contents is jeopardized. In these instances it is advisable to provide a sample container of a type similar to the package in common use, in this case a cardboard box.

Compressed gases are perhaps the most difficult group of chemicals to package and ship, yet they represent new products which numerous experimenters need in small quantities for research purposes. In the case of nitrosyl chloride it was necessary to design special 10-pound nickel cylinders equipped with all-nickel valves and fittings in order to provide a suitable sample for use in research laboratories. Fortunately, not all packaging problems are this complicated. Steel cylinders have been used successfully to ship nitrogen tetroxide.

Some thought should be given to the manner in which the user is going to handle a sample. Plan the easiest way for him to go about it. For example, in sending out a sample of synthetic detergent for test as a flotation reagent, the best procedure is to send not only the dry powder but also a bottle of solution with a calibrated glass dropper adjusted to standard laboratory flotation cells.

WIDE-MOUTHED BOTTLES are suitable for many granular and flake materials, allow use of a spatula to remove the contents.

CONSUMER ACCEPTANCE test results may be jeopardized if sample is not packed in usual container, such as box for detergents.

LABELING IS IMPORTANT

Another detail which seems minor but which is of great importance, is proper labeling. Most laboratories receiving new product samples prefer a label showing the recognized chemical name of the product or a description of the composition if it is a mixture. There is no place for trick names or secret code numbers without good reason for their use. We have heard of a case where a sample sent under a code number without further description was used through half a trial run before the plant operator learned that the sample contained an ingredient quite harmful to his operation. The antagonism which this created could have been avoided by a proper labeling procedure.

Printed labels are an asset. They are not easily smudged and are clearly legible even after several months on a laboratory shelf. The added attention value is desirable where there may be several competing products on the same shelf.

Finally, it is sound policy to prepare for each new product a folder or booklet describing its chemical and physical properties, precautions to be used in handling, and suggested methods of application. Everything of importance should be included in the folder in order to avoid duplication of effort on the part of other experimenters. It sometimes happens that continued research will turn up something not included in the original report. It may be of vital importance; for example it may point to a type of reaction that is hazardous, or to some unsuspected contaminating agent, or to short cuts that save hours of work. In such instances all technical journals are glad to make this information known to their readers if the facts are fully and carefully reported.

The preparation and distribution of samples is a costly and time-consuming undertaking when it follows the pattern outlined above. Yet most companies follow a program of this kind in the belief that it is the best and most efficient way to develop new markets and to explore new chemicals which may ultimately benefit all industry. They ask in return that the people receiving samples help to evaluate the technical possibilities of the new product and provide the basic information on which to build an estimate of potential consumption.

WHAT DOES WATER COST?

by D. B. HERTZ
Culpepper, Hertz, Inc., New York, New York

THE COST OF WATER varies greatly with the source, purity needed, and quality required. Summarized here are well drilling costs, operating costs for cooling towers, and treatment costs.

WATER costs money, but without either money or water, chemical process operations are not possible. Water is to chemical processes what money is to the economic system. It is the great medium of exchange and like money there is often not enough. Water is used for carrying out reactions, for cooling, for transferring materials, and for cleaning products of various stages of process operations.

The overall aspects of water supply economics will be discussed here, not the technical details. Those elements which may not be so widely known have been chosen to give a general picture of what it costs to get water, and what it costs to do something with it once you have it.

Equipment has been classified and with the cooperation of suppliers approximate 1949 costs determined.

SOURCES OF SUPPLY

There are three major sources of industrial process water:

a. Ground or well water
b. Surface (river or lake) water
c. Purchased water from municipal or other suppliers

Water for certain purposes is also obtained from the oceans, but this source is not of importance except to those plants on the sea coast.

GROUND WATER SUPPLIES

How much does it cost to obtain water? If the plant is near water-bearing strata, it may be economically advantageous to drill a well. Its cost depends upon its depth, the amount of water required, which determines the well diameter, and soil formation.

WELL COSTS

Well costs are directly proportional to each of the above factors. Thus, cost can be expressed as a constant (k) multiplied by diameter of the well in inches, depth in feet, and a factor for the type of soil. If the constant (k) equals $1 per inch of diameter per foot of depth, then the soil factor (f) will range from 1 to 4 depending upon the formation: approximately 1.0 in sandstone or average rock to 4.0 in an unconsolidated formation of clay, sand or gravel.

Cost per gpm may range from $10/gpm to over $100/gpm. Two wells were drilled fairly close together on the Jersey coast by the same contractor. Well "A" was in the so-called Kirkwood formation, about 130 to 150 feet deep, and produced 1000 gpm. This well cost $27,000 which included drilling costs, the pump, aerator and all appurtenances. Well "B" was in the so-called Englishtown formation, about 800 feet deep and produced only 300 gpm. Its cost complete was $23,000. However, water "A" had 12 ppm of iron, and 6 grains total hardness, while water "B" practically no iron and two to three grains total hardness. Well "A" might have been false economy to a rayon spinner.

Wells are originally drilled on three types of contracts: (1) the foot price basis, a fixed sum per foot drilled; (2) a lump sum basis, a fixed sum for obtaining water, including pumping equipment, etc., and (3) a guaranteed production basis, a fixed sum for producing at least a specified amount of water. The latter often includes a bonus for additional production. In general, the most advantageous contract for industrial users is the guaranteed production basis. This may be higher in bid cost, but relieves the engineer involved of the nightmare of mounting footage in the first type of contract, after he has assured his superiors that water would be obtained in "another fifty feet," and the similar nightmare of inadequate supplies in the second.

A deep well turbine pump for delivering against 50 psig, at a depth of approximately 200 feet will cost between $10 and $15 per gpm capacity. Higher pressures and greater depths are, of course, more costly.

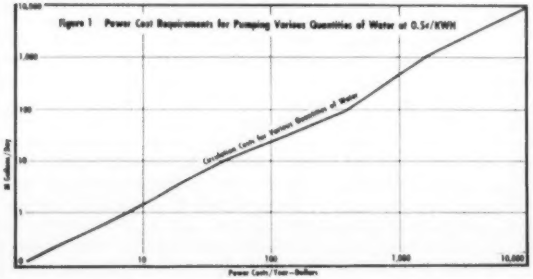
Maintenance of a properly constructed well is quite low, running to an average of $100 per year per well. For pumping equipment, maintenance averages about $150 per year.

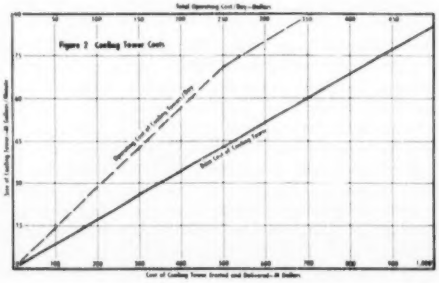
Not considering depletion, which varies from locality to locality, the generally accepted depreciation rate runs from 10 to 50 years for the well itself. A satisfactory average to use for both pumps and wells is 15 years.

At $0.01 per KWH, power will cost approximately $5,200 per year per 1000 gpm delivered. Thus, the cost of water from a 1000 gpm well, which might have average investment cost of $40,000 the yearly costs, on a 15 year straight line depreciation would be:

Depreciation, well and pump	$ 2,700
Power costs	5,200
Maintenance	250
Interest @ 6%	2,400
Total	$10,500/1000 gpm/year

The Ranney system of collectors should not be overlooked. If conditions are right, one well can pro-





duce from ten separate wells. The cost of installing a Ranney well will be at least $20 per gpm, and may run up to as much as $70 per gpm. However, such wells have a longer life than ordinary vertical wells and the cost of the water obtained is slightly less than that for vertical wells.

PURCHASED WATER

If 1000 gpm of water were purchased from a municipality, it would cost about $50,000 a year in the Metropolitan New Jersey industrial area. These costs are quite reasonable, compared to other localities. This is nearly five times the $10,500 cost for the same amount of well water. Purchasing water is quite expensive, and various means are taken to avoid it. Drilling your own well is one way, and recirculating water for cooling purposes is another.

PROCESS WATER COOLING

Recirculation of process water generally requires that the water be cooled since most chemical processes add heat to the fluid. The cooling tower is ordinarily the most efficient means. By its use, water may be reused up to fifty times. This is done by Celanese Corp. at the Bishop, Texas, plant (*CI, Feb. 1949, p. 240*). And each time water is reused, the total water requirement is reduced. Without discussing the technical aspects of selecting cooling towers, it should be clear that the direct cost and size determination depends upon the temperature of the water entering, the temperature of the desired effluent, and the wet bulb temperature of the atmosphere. The higher the entering temperature, and the closer the wet bulb temperature to final temperature, the larger the cooling tower. The final choice and design must be worked out by the company's engineers and those of the companies furnishing installations.

However, the average engineer would like to make a rough preliminary estimate for the cost of erecting and operating a cooling tower (Fig. 2). This is based upon the requirement of cooling water from 100° F. to 80° F., with an ambient wet bulb temperature of 75° F., conditions representative for average run-of-the-mill circumstances. The lower curve shows the erected cost of cooling towers of the induced draft type of standard construction for water rates ranging from 5,000 gpm to 90,000 gpm. These range in cost from about $50,000 delivered and erected to over $1,000,000, approximately $10,000 per 1000 gpm circulated through the tower.

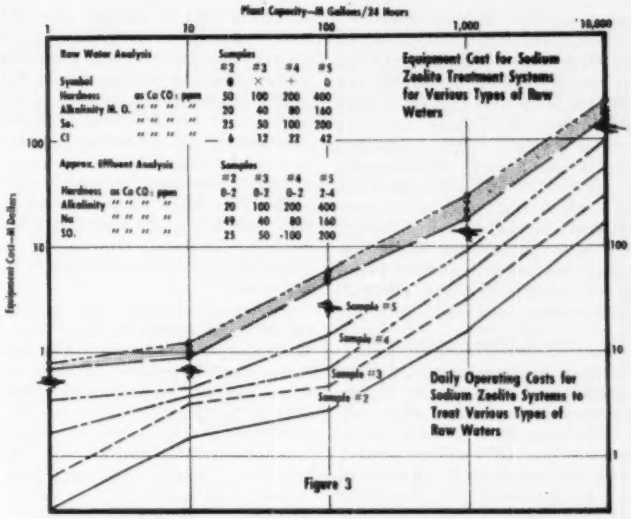

Plant Capacity—M Gallons/24 Hours
Raw Water Analysis
Samples
#2 #3 #4 #5
Symbol 0 × + 0
Hardness as Ca CO₃ ppm 50 100 200 400
Alkalinity M. O. " " " " 20 40 80 160
So. " " " " 25 50 100 200
Cl " " " " 6 12 22 42
Approx. Effluent Analysis
Samples
#2 #3 #4 #5
Hardness as Ca CO₃ ppm 0-2 0-2 0-2 2-4
Alkalinity " " " " 20 100 200 400
Na " " " " 49 40 80 160
SO. " " " " 25 50 -100 200
Equipment Cost for Sodium Zeolite Treatment Systems for Various Types of Raw Waters
Sample #5
Sample #4
Sample #3
Sample #2
Daily Operating Costs for Sodium Zeolite Systems to Treat Various Types of Raw Waters
Equipment Cost—M Dollars
Operating Cost/Day—Dollars

Figure 3

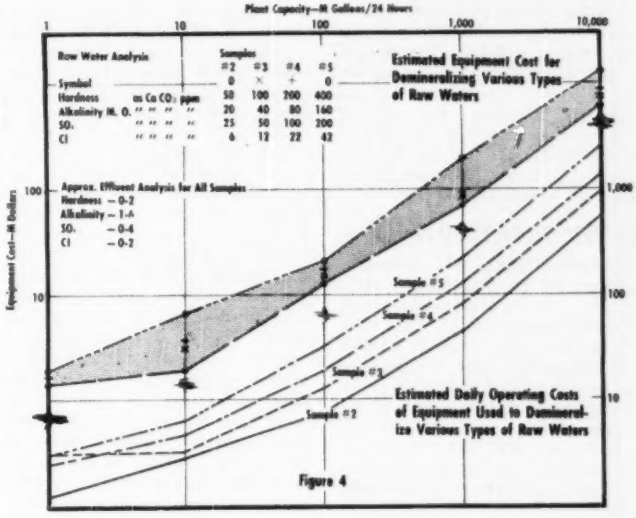

Plant Capacity—M Gallons/24 Hours
Raw Water Analysis
Samples
#2 #3 #4 #5
Symbol 0 × + 0
Hardness as Ca CO₃ ppm 50 100 200 400
Alkalinity M. O. " " " " 20 40 80 160
SO. " " " " 25 50 100 200
Cl " " " " 6 12 22 42
Approx. Effluent Analysis for All Samples
Hardness — 0-2
Alkalinity — 1-A
SO. — 0-4
Cl — 0-2
Estimated Equipment Cost for Demineralizing Various Types of Raw Waters
Sample #5
Sample #4
Sample #3
Sample #2
Estimated Daily Operating Costs of Equipment Used to Demineralize Various Types of Raw Waters
Equipment Cost—M Dollars
Operating Cost/Day—Dollars

Figure 4

The operating costs, shown on the upper curve, range from $20 a day for 500 gpm to approximately $325 a day for 80,000 gpm. Power costs for fans and pumps, maintenance, and depreciation are included, but not interest on the investment. If interest on the investment is taken into consideration in addition to the operating costs, 1000 gpm of water to be processed in a cooling tower will cost approximately $7,700 per year. Since this amount of water would cost approximately $10,500 if obtained from a well (if the supplies were sufficient), or $50,000 per year if purchased from a municipality, it is apparent that with any reuse at all greater than once, the cooling tower becomes economical to add to a well or purchased water supply. There are, of course, losses to be figured from windage and evaporation, but these are relatively unimportant.

SURFACE WATER SUPPLIES

Cost of using cooling towers is not comparable with the cost of obtaining water from surface sources. Each instance in obtaining water from a river, lake or ocean source is a special case, and it is not wise to generalize. The pumping cost will be approximately the same, but the capital investment, in

canal or pipeline will vary widely. As an example, one installation cost $2000 per 1000 gpm for a plant built adjacent to a river as against the $20,000 per 1000 gpm investment cost for a plant located many miles away from the source of a surface supply. However, once the conditions of surface supply are specified, an estimate in terms of pipe size and length and pumping requirements is not difficult. Surface water of course requires considerably more cooling and treatment as a general rule than well water (or purchased municipal supplies).

CIRCULATION COSTS

To those who handle water, the cost of circulating it is a subject of considerable importance. Generally speaking, approximately 1 KWH of power is required per 1000 gallons pumped, against an average head. In terms of yearly power costs Fig. 1 shows these costs for various quantities per day. Commercial ranges of pump sizes have been taken into consideration, but interest, depreciation, or maintenance have not been included. The costs of the pumps involved is comparatively low, as is their maintenance and depreciation. However, the costs of pumping alone, at 0.5¢ per KWH amounts to $10,000 per year for 10,000,000 gal. per day. At 1¢ per KWH, this would be $20,000 per year.

WATER TREATMENT

Obtaining, cooling, and circulating water are not the only process water problems. The quality of water is of the utmost importance. For the most part, the water supply must be tailored to fit the process. The technical details have been well outlined in many sources, but an overall picture of the economics of these processes is needed. By distillation, 1000 gallons of distilled water may be obtained from a steam evaporator for $1.00 to $1.50—$1000 to $1500 per day for a million gallons per day, which is a relatively small water requirement. A compression distillation unit will furnish this same amount of water for approximately $500. However, the investment costs in either of these types of units is much higher.

SODIUM ZEOLITE SYSTEMS

Each time the purity requirements on the finished water are raised, or the source is of poorer quality, the cost of investment and operation is increased. Fig. 3 shows the equipment costs for sodium zeolite systems for four types of raw waters for capacities ranging from 1,000 to 10,000,000 gallons per day. Sodium zeolite (and sodium zeolite plus hydrogen) systems are more commonly used in industry than the more complete demineralization systems. There are also less expensive systems than the sodium zeolite for specific purposes, such as settling basins, hot and cold lime-soda softeners, chlorination, pH correction, and reduction of hardness by a Calgon type softener. These have not been included for the sake of simplicity, and as their installation and operating costs are less than those shown in Fig. 3, they need not be considered further in this article.

Sodium zeolite reduces the hardness but does not reduce the total solids. If a hydrogen cycle is added, the alkalinity would be reduced as well, resulting in a total solids decrease equivalent to the alkalinity reduction. The cost of the hydrogen system plus zeolite is about 25% greater than the sodium cycle alone. Again the former have not been included for the sake of simplicity. The analyses shown on Fig. 3 range from a good water to a rather poor one. A single unit is usually sufficient up to 100,000 gallons per day. The costs have been estimated on this basis, since it is assumed that storage capacity is available to permit a constant supply of water during the regeneration period (which will last approximately one hour). Above 100,000 gallons per day, more than one unit would be used, so that the load could be carried during the regeneration cycle. It does not follow that the best zeolites from a first cost standpoint have been selected, since these estimates are based on the use of a resin zeolite.

Green sand could undoubtedly be used more economically on the softer waters as regards first cost, but the resins have the advantage that they can be used for a greater variety of pHs and iron contents, and require less washes and rinses due to higher capacities per regeneration. The costs shown run upwards for each capacity from the softer waters to the harder ones, and range from approximately $800-$1500 at 10,000 gallons per day, to $165,000-$262,000 at 10,000,000 gallons per day.

The operating cost for the sodium zeolite system includes labor and regenerants, and these costs for the same ranges of equipment are shown in Fig. 3. It will be seen that these run from less than $10 per day for the 1000 and 10,000 gallons per day units up to approximately $100 a day to operate the system on the softest water, and $800 a day on the hardest for the 10,000,000 gallons per day systems. This represents a regenerant cost ranging from 1.0¢ per thousand gallons for the softest water, to 8.0¢ per thousand gallons for the hardest, with a labor cost of $50 per day. Good equipment requires very little maintenance, and the principal costs are those of replacement of zeolite lost through attrition. This runs about two percent of the equipment cost per year.

DEMINERALIZATION SYSTEMS

Equipment costs for demineralizers are considerably higher. On the other hand, the additional costs may be repaid by the better quality of water produced. Fig. 4 shows the general variation in cost for demineralizing the same raw waters discussed previously, for the same range of capacities. However, here the effluent water will have its hardness reduced to 0-2 ppm, and its alkalinity to 1 to 6. The cost of silica removal has not been included, although this may be important in some cases. However, the cost of installing silica removal along with anion and cation exchange will depend to such a large extent upon the exact conditions that it is not possible to generalize. The installed costs of these demineralization plants will run from approximately $2100 for 10,000 gallons per day for the softest water to $2700, and from $568,000 for the softest water to $1,100,000 for the hardest at 10,000,000 gallons per day capacity.

The operating costs for demineralizer units are shown in Fig. 4. These are a great deal higher than the operating costs for zeolite units, ranging from $8.00 a day for the softest water to $36.00 a day for the hardest at 100,000 gallons per day and from $500 to $2500 a day for 10,000,000 gallons per day. This represents approximately 3.0¢ per 1000 gallons for regenerant for the softest water and 20.0¢ per 1000 gallons for the hardest. Labor costs range up to $72 a day. Maintenance cost is quite low and a 10 year life can be safely assumed. The loss in resin capacity will run around 10% per year. However, this may amount to about 5% on the cost of the plant.

ACKNOWLEDGEMENT

Acknowledgment is gratefully made to the many companies who so graciously assisted in compiling the data.

Among those who should be particularly thanked are: Ingersoll-Rand Co., Ranney Method Water Supplies, Artesian Well & Equipment Co., C. W. Lauman & Co., Layne-New York Co., Marley Co., Phillips Cooling Tower Co., Santa Fe Tank & Tower Co., Turbine Equipment Co., Permutit Co., Illinois Water Treatment Co., Refinite Co. and Wallace and Tiernan Co.

Derived from a paper presented before N. Y. Section of American Institute of Chemical Engineers, November 17, 1949.

Where is Water Short?

Here is U. S. Geological Survey's Answer

THE existence of water shortages in many areas is well-known to the process engineer (*CI, Jan. 1950, p. 21*). The available data on various areas of the country have recently been collected and collated by the U. S. Geological Survey. However, in many areas the data are insufficient to determine exactly how short the supply may be and what, if any, remedies exist.

In many areas additional water can be made available. But additional investigations are required to assure the greatest benefit from existing and potential sources.

Listing of certain areas as "critical" does not bar further industrial development. Many such areas become "water conscious," and arrange for complete investigations of supplies to develop all sources. Effective "water management" can maintain a high level of economy without resorting to extensive engineering works.

EAST

The water problems in this region are largely those created by increasing industrial and municipal usage. There have been no serious droughts. Investigations are needed into quantities of water used, methods of increasing use efficiency and long-term needs.

New England: Water levels have declined in the heavily pumped industrial areas. Local salt water encroachment has resulted from overpumping in some coastal cities and towns.

Baltimore and Philadelphia: Heavy pumpage, declining water levels, and possible local or even area-wide overdevelopment exist, but facts are not in. Encroachment of salty or other poor-quality water is occurring in places.

Long Island: The critical situation in Brooklyn in the early 30's has been relieved somewhat by artificial recharge and reduced withdrawal. In the middle 30's, water table was below sea level in nearly all of Brooklyn. Following the 1947 shutdown of 26 million-gallon-a-day privately owned waterworks pumping station in Flatbush, water table has recovered so it is now below sea level in less than half of Brooklyn. However, New York is now pumping south-shore wells and galleries (mainly in Nassau County) very heavily to supplement its short supply, and salt-water encroachment may occur if pumping continues.

New York City and metropolitan New Jersey: Demands in excess of dependable yield have resulted in overdrafts on surface-water storage, during a period of moderate drought. New supplies for New York City under construction in Delaware Basin will meet only short-term needs. Long-term appraisal of needs and supplies are needed.

SOUTHEAST

Water-supply deficiencies are largely due to over pumping of ground water in rapidly expanding industrial areas. Surface water supplies have been generally adequate during the past year, but drought can cause shortages of water for hydroelectric power generation and municipal use.

Memphis area: Water levels declining, but no overdevelopment is indicated.

Alabama: Declines and possible local overdevelopment noted at Montgomery and Selma; salt-water encroachment into shallow sands at Mobile.

MIDWEST

Water shortages exist for industrial and municipal use. Studies are needed of quantities and qualities of water used.

Chicago area: Cambrian sandstones are overpumped and water levels declining. Levels will probably stabilize at maximum practicable pumping levels and yield will decline gradually for a long time.

Milwaukee and Minneapolis-St. Paul areas: Conditions reported to be similar but less information is available. Minneapolis-St. Paul are near a recharge area and levels may stabilize.

Peoria area: Reported critical, artificial recharge of gravels considered. Induced infiltration from Illinois River by placing wells closer to stream needs study.

Indianapolis area: Critical in 1940-41 but better now.

Cincinnati area (Mill Creek Valley): Overdeveloped several years ago and levels more or less stabilized at low stages. Trouble would result if withdrawal were increased substantially. Additional water developed during war in Miami Valley south of Hamilton, and additional water available by induced infiltration along Miami River.

Louisville: Critical during war. In 1943 pumpage of 63 mgd exceeded recharge by 20 mgd. Conservation has reduced withdrawal to safe yield except in downtown district where levels will decline until withdrawal is reduced or additional recharge from river is induced. Studies show 50 ± mgd available by induced infiltration and rainfall recharge southwest of city, and 280 ± mgd by induced infiltration to northeast.

OHIO: The Mahoning River is the most intensively used river in Ohio, if not in the United States. Daily average pumpage by industrial plants averages 1.2 billion gallons daily. During Dec. 1949, even with regulation afforded by Berlin and Mosquito Creek Reservoirs, the flow in Mahoning River at Youngstown fell to 114 million gallons daily. Thus the entire flow was reused over ten times, resulting temperatures approaching 140°F. and quality reduced.

The Mahoning is the most polluted stream in the United States. Sewage treatment plants are being planned but cannot be effective unless the river temperatures can be reduced. High river temperatures result in oxygen depletion, essential for sewage disposal. Reduced river temperatures can be obtained only by creating more water storage for release during flow deficiency.

SOUTHWEST

Increasing use of water for irrigation, especially rice, caused considerable overdraft on available supplies. Studies into new sources of water and into future needs for water are needed.

TEXAS (Southern High Plains south of Amarillo): Pumpage of about 30,000 acre-feet for irrigating 35,000 acres in 1935; more than a million acres irrigated from 10,000 wells in 1948. Recharge in area estimated at roughly 50,000 acre-feet per year, natural discharge of this amount at edges of Plains not yet reduced by pumping. One of most critical areas so far as future is concerned. Small areas beginning to have trouble now and will be in serious trouble within 5 to 10 years. No sizable surface supplies nearby, though it is planned to develop some water from Canadian River for municipal use. Rainfall is under 20 inches per year, ground-water recharge a fraction of an inch per year.

Texas City area: Water levels are declining and salt-water is encroaching. The Houston area to north, however, shows no signs of definite overdevelopment, though water levels decline in response to increasing withdrawal.

Kleberg County and adjacent area: Water levels declining; area is possibly overdeveloped.

LOUISIANA (Southwest Louisiana Lake Charles area): Declining water levels and rising salt content indicate danger of local overdevelopment. Shortages of stream flow for rice irrigation in recent years have led to heavy use of ground water and to curtailment of production. Investigations are needed into the possibility of developing reservoir storage and for diversion of water from streams outside the rice area.

Baton Rouge: Water levels still declining, though levels in shallow sands are more or less stabilized at present low levels. Additional water is available from same sands outside city, from deeper sands (though warmer water), and from Mississippi River alluvium, especially across river to west.

WEST

Irrigation is the major use of water, but municipal and industrial uses are increasing on the West Coast. Readily available surface-water supplies have already been appropriated, hence increasing use is being made of ground water. Many unknown factors of rates of recharge or effects on surface-water uses have created many complex basin problems.

In the arid West, surplus flood waters and water now wasted by phreatophytes, underground organisms, are the last major sources of new water. The latter is estimated crudely at 20-25 million acre-feet per year. Some water must be allowed to flow out of the basins to keep salt content down, but there is still considerable water to be developed.

CALIFORNIA: Overdraft (according to best estimates, which are based on incomplete data) exists; East side of southern San Joaquin Valley, 0.5 to 1 million acre-feet per year; west side over 0.5 million; rest of Central Valley as a whole, not overdeveloped except locally; outside Central Valley, overdraft unknown but probably less than 1 million; total, probably roughly 2 million acre-feet, or about 2 billion gallons per day. Valleys outside Central Valley known or believed to be overdeveloped include Santa Clara Valley, lower east side of Salinas Valley, Santa Maria Valley (Santa Barbara County), Ventura-Oxnard area; Antelope Valley; upper Santa Ana Valley; and main and west basins of the coastal plain at and near Los Angeles.

Use of ground water for irrigation in California is now about same as surface water—roughly 10 million acre-feet per year each. Storage reserves in power reservoirs have been decreasing due to a succession of dry years and an increasing demand for power.

Proposals have been made for diverting water from the Columbia River Basin where there is a surplus to the California Central Valley and Southern California areas where lack of water severely restricts development.

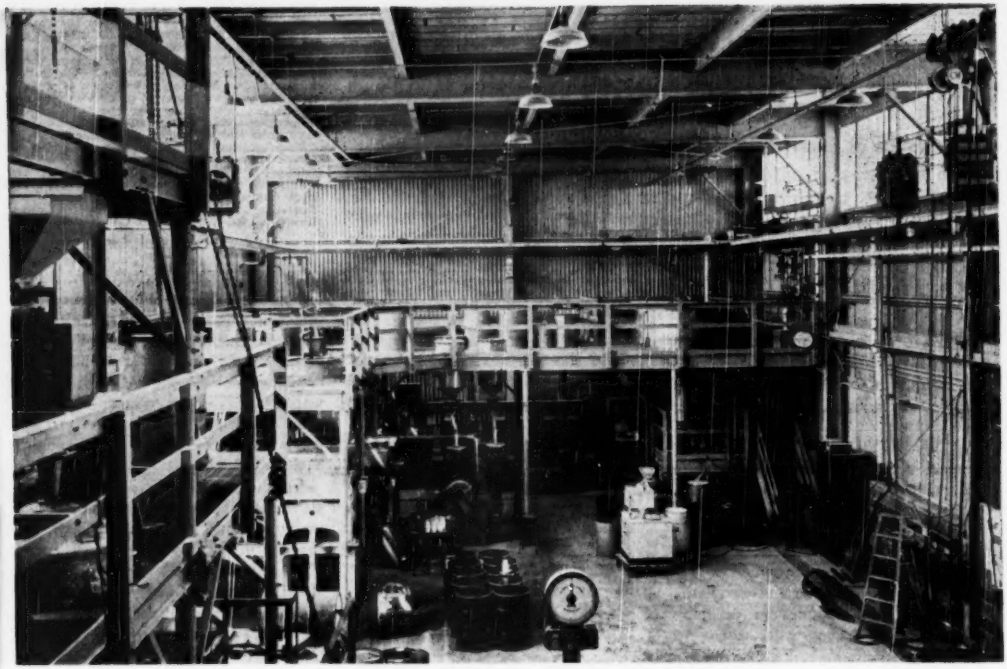
NEW MEXICO (Carlsbad area): Heavy pumping for irrigation began in 1947, water levels going down; safe yield not yet ascertained.

NEVADA AND UTAH: Reservoir storage for irrigation is very low and shortages of surface water next year are in sight.

No overdeveloped ground-water areas to speak of and few fully developed areas, of which Las Vegas valley appears to be one. Considerable additional water available for development; now being wasted by phreatophytes, underground organisms.

CONCLUSION

Critical water shortages can be met or avoided by properly analyzing the needs of quantity and quality water needed and by design of systems on the basis of adequate information on the dependable long-term yield of the sources of water to be developed. The Geological Survey states that present water shortages are due almost exclusively to failure to make adequate hydrologic studies as a basis for planning.



GENERAL LAYOUT of Davison's custom catalyst plant. Transfer containers for materials are carried by mono-rail hoist system to various equipment stations, are specially designed to fit interchangeably the charge hoppers and discharge openings of all equipment. Containers hold 40 gal.

Versatility Characterizes New Specialty Catalyst Plant

EDITORIAL STAFF REPORT

DESIGN A STANDARD SMALL PLANT to accommodate manufacture of a wide variety of custom products. That was the problem handed the designers of Davison's specialty catalyst plant. Here is the result.

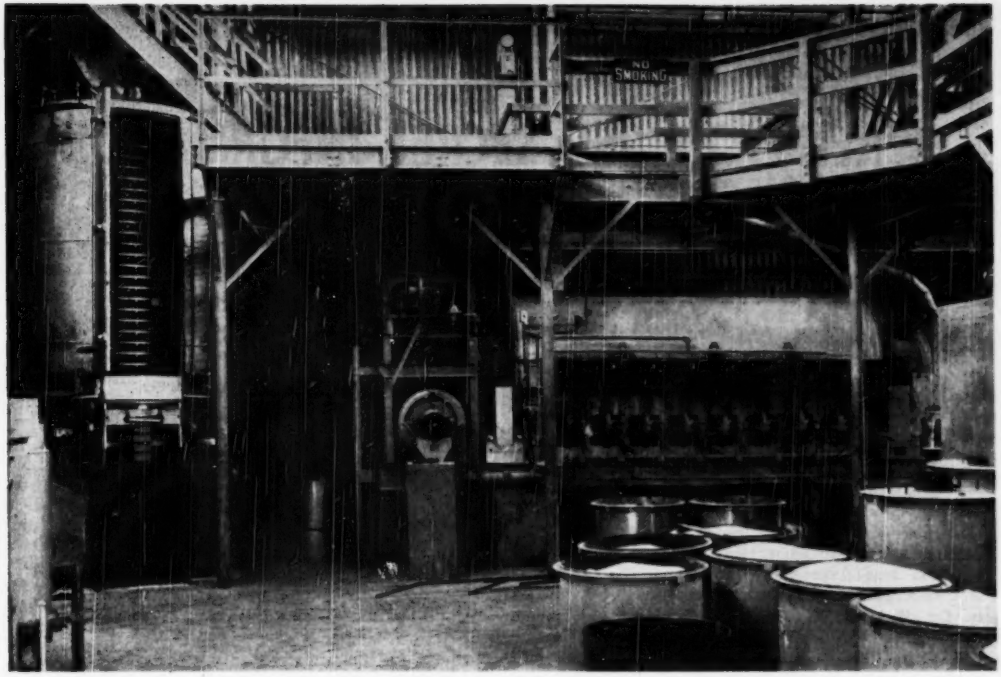
EARLY last year The Davison Chemical Corp. completed a specialty catalyst plant at its Curtis Bay, Md., works that is believed to be the first of its kind and which provides an interesting example of flexibility and versatility in a modern chemical operation. Designed both to develop and manufacture small-lot custom catalysts for a wide range of industrial applications, the plant is arranged and equipped to switch quickly from one product to another with a minimum of time and expense. The new operation supplements Davison's present catalyst plants which are designed for large-scale continuous production of a particular product.

The installation consists of an assemblage of unit operations so arranged that they can be inter-connected to meet the requirements of almost any given catalyst manufacturing problem. All catalyst processes can be broken down into a series of standard steps. These include solution preparation, mixing (liquid-liquid, liquid-solid, or solid-solid), filtering, drying, activating, grinding, sizing, and pelleting. The new plant includes equipment for all of these operations. Materials of construction have been selected to resist the corrosion problems most frequently met.

One ton per 24-hour day has been set as the minimum plant capacity. This figure was used to determine size of key equipment with particular reference to the manufacture of selected catalyst types most apt to be made. Actually, several tons per day of some materials can be produced.

For instance, the primary gel-drying equipment was designed to process silica hydrogel producing approximately one ton of silica, dry basis, per day. This operation involves the evaporation of nearly seven tons of water per twenty-four hour period and is a limiting factor. If the water load is materially decreased in a given process, the capacity of the unit can be increased several fold. Where economically feasible, equipment has been over-designed.

The activation equipment is designed to operate at temperatures up to 2,000° F. on a continuous basis.



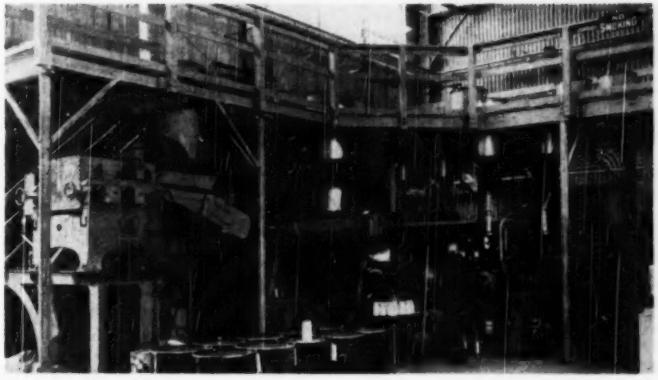
GEL DRYING EQUIPMENT. Continuous stainless steel activator at right provides considerable leeway over ton-a-day design capacity of plant. Primary silica dryer at left was designed to produce about one ton per day of silica, dry basis. Where feasible equipment is overdesigned.

The high alloy rotating shell is externally fired and facilities are provided for controlling bed depth and residence time in the activator.

Two types of grinding have been provided, a conventional roll mill and an impact unit. For most of the work the impact grinder will be employed, especially when finely divided products are desired. The unit is equipped with a separating device for producing selected cuts such as are generally employed in fluid catalyst operations. Nominal capacity of this grinding equipment is approximately twenty thousand pounds per 24-hour day. When grinding the usual type of material, the roll mill also has a capacity of several tons per day and will be employed to produce a granular type of material.

A Sigma mixer of thirty-five gallons capacity provides adequate equipment for the blending of powdered solids with impregnating solutions. For convenience, this is located near the impact grinder.

Pelleting capacity is designed to permit the production of one ton per day of one-eighth inch alumina pellets and simultaneously one ton per day of three-eighths inch pellets. A powder blender has been provided for preparing the charge to these machines.



GRINDING is done in roll mill at left when granular product is wanted. An impact grinder is used for finer materials. Powder blender prepares feed for pelleting machines in background.

Filtering and associated equipment is of an advanced type. A horizontal, continuous, stainless steel Oliver filter provides adequate capacity for anticipated requirements. Two 500-gallon stainless steel vessels hold the charge to the filtering unit.

A series of tanks has been provided for liquid mixing and solid impregnating purposes. These are jacketed for temperature control and equipped with stirring facilities. Solution transfer pumps are provided where needed.

One of the features of this plant is a novel means of materials handling. Cylindrical steel transfer containers of 40-gal. capacity have been specially designed to fit interchangeably the charge hoppers and discharge openings of all equipment. These containers are handled by means of a versatile mono-rail system that permits quick and easy transportation to any of the various equipment stations.

Be sure you know what you are doing . . .

WHEN YOU USE SECRET INFORMATION

by ROBERT CALVERT, Patent Attorney, New York, N. Y.

Receipt or purchase of an invention from an outsider except on the basis of his patent rights is fraught with pitfalls. Here are some and how to avoid them.

VIRTUALLY every company in the process industries is approached from time to time by independent investors offering ideas in confidence for new products, new processes, or other innovations presumably of value in the company's business. Not infrequently such contacts result in the disclosure of information of great value to a company and for which it is willing to pay accordingly.

More often, however, they do not. It is important, therefore, that negotiations for and the use of information offered in confidence be carried out in accordance with accepted legal safeguards if trouble is to be avoided. This applies not only to company officials or persons authorized to make contracts for the company, but also to technical or other employees who at any time may be in a position to receive information offered in confidence. It is not at all uncommon for an unauthorized employee unwittingly to implicate his company in a way that may result in lengthy and expensive litigation.

The purpose of this article is to set forth some of the hazards involved in the use of secret information and also some of the methods of protection against such hazards.

The courts generally have been justly assiduous in defeating attempts to delve into the pockets of business firms through spurious claims for compensation for the use of ideas. Thus to be rejected are attempts made by telephoning or writing vague ideas to business corporations and then seizing upon some later general similarity between their products and the notions propounded as a basis for damages. Corporations are required, on the other hand, to pay reasonable value for the use of inventive ideas disclosed in expectation of payment.[2]

It is important, therefore, that the inventor who wishes to disclose secret information should not be permitted to do so or should be required, at the least, to agree in writing as to his rights and compensation expected before any disclosure is accepted from him.[1]

ATTITUDE TOWARD OFFER

Because of the hazards involved, the attitude of a company representative toward a person who offers secret information should be one of informed caution.

There are, it is true, conditions under which inventions of value are offered properly on the basis of secret information. There are discoveries that are potentially useful and profitable but, on the other hand, are outside those classes of subject matter on which alone the law authorizes the issuance of patents. Other discoveries, while relating to subject matter within the statutory classes, may not be patentable for lack of invention. A new pie mix, for instance, may be exceptionably profitable for a food distributor. Yet it may be considered by the Patent Office merely as a new recipe in which all ingredients serve only their usual functions and which, therefore, is not patentable. In other instances, the attorney seeking to save expense for his client may have advised the inventor to test the value of the invention by determining the interest of informal parties in advance of filing the patent application. Finally, there are instances of many able persons who, regardless of any advice that may or may not be given them, lack the money necessary to file upon their inventions.

Generally, it will be found that an invention is offered in advance of filing the patent application for one of the following reasons:

(1) A laudable cause as stated above. (2) The inventor lacks the confidence in the invention required to justify use of his own funds for filing the application. (3) The inventor may previously have determined that the development is not patentable. (4) The inventor prefers to operate with secret information rather than patent license procedure, for the reason of the very uncertainty of secret information arrangements that may give the discloser an advantage in a poorly drawn or informal contract.

Secret information may be offered to one buyer after another, on an option basis or otherwise, without demise or even growing old or ever having to face the question of patentability as must an application.

The inventor who offers information to one not in position to judge either its utility or its novelty should be handled particularly gingerly. Things are being done every day in the textile industry, for instance, that are unknown to an expert in the chemical industry and vice versa.

Inventors going to a representative of a different art will sometimes spin long and interesting yarns. Some inventors explain that a large company in the industry directly concerned has been trying to buy the invention, etc. Such stories are seldom to be believed.

HOW TO AVOID RECEIVING

Information of a confidential nature should be received only after a satisfactory agreement has been reached with the offerer. In the absence of any such agreement, it is to be expected that a court would consider the later use of the information, with knowledge of an official of the corporation, to constitute acceptance. This is to be expected even though the information came unsolicited and even though it may have been disclosed to an employee in a minor position not empowered to obligate the corporation. The principle here is that the user is not entitled to unjust enrichment in use of the disclosure.

AN INVENTOR OFFERS YOU AN INVENTION WITHOUT HAVING FILED A PATENT APPLICATION. UNLESS YOU KNOW ONE OF THESE TO BE THE REASON . . .

1. The discovery is potentially useful and profitable but is outside the subject matter on which the law authorizes the issuance of patents.

2. The inventor wishes to test the value of the invention by determining the interest of informed parties in advance of filing the patent application.

3. The inventor, able and honest though he may be, simply does not have the money necessary to file.

. . . BETTER LOOK FOR ONE OF THESE

4. The inventor lacks the confidence in the invention required to justify use of his own funds for filing the application.

5. The inventor may previously have determined that the development is not patentable.

6. The inventor prefers to operate with secret information rather than patent license procedure, for the reason of the very uncertainty of secret information arrangements that may give the discloser an advantage in a poorly drawn or informal contract.

Secret information may be offered to one buyer after another, on an option basis or otherwise, without demise or even growing old or ever having to face the question of patentability as must an application for a patent.

If a voluntary disclosure comes in the mail, it is good policy to return it to the sender along with a statement to the effect that the letter appears from its opening statement to be a disclosure, it has not been read, and will be read and considered only after it has been made the subject matter of a patent application or after the discloser has met whatever conditions are to be imposed in advance of receiving secret information.

In the case of a proffered voluntary oral disclosure, the disclosure should be prevented at the beginning with a similar type of statement.

AGREEMENT BEFORE RECEIVING

Agreement before disclosure is desirable from the standpoint of both parties. The person having an idea to sell, if he is acting in good faith, will want to know the conditions under which he can expect payment and the amount of it. The one receiving the information will want to have this clearly understood for his own protection. He may need also the approval of officials of his company before committing the company as he may otherwise do in the absence of an explicit contract.

If the submitter of the idea has a patent upon it or has filed an application for patent, he should be required to rely solely upon his patent rights.

Under a different circumstance, one offering the idea or invention before filing upon it should be requested to have a competent patent attorney submit the disclosure in patent application form, along with an agreement of the inventor to rely upon what may later be patented on the subject matter of the prepared application. This procedure may save time. It saves the cost of actual filing of the application before its consideration by the possible user. It gives the inventor the opportunity of presenting his invention in a document prepared by one who should be expert in describing inventions in such manner as to emphasize the feature that constitutes the invention.

As an alternative, a written release may be accepted in place of reliance entirely upon the patent or application. An example of a letter release in approximately the form used by a large company follows:

RELEASE

The A. B. F. Company
New York, N. Y.
Dear Sirs:

You have expressed some interest in obtaining *from me* a full disclosure of my idea for a . . . . . , for the purpose of your evaluation of it. I agree to make this disclosure and enter into any subsequent negotiations on the following conditions.

If, upon my disclosure of the . . . . . , you find that the information thus disclosed is new and hitherto unknown to you, it is understood that the A. B. F. Company will make no use ot the information (including disclosure to outsiders) for at least three years without first obtaining my written consent; provided, however, that this agreement not to make use of the information will not extend beyond such time as the information may come into general or widespread use not subject to my control.

If, on the other hand, you find that the information thus disclosed is not new or is already known to you, it is mutually agreed that you shall be free to make such use as you desire of the information and shall be under no obligation to me.

It is further understood and agreed that you shall be under no obligation to make any use of this information, whether or not you find it is new and now unknown to you; also that, if it proves to be new and now unknown to you, and you decide nevertheless to continue to keep the information in confidence for the aforementioned period, and during this period to make no use of it, you shall be under no further obligation to me.

Yours truly,

CANCELLATION CLAUSE

Cancellation clauses are desirable in agreements relating to secret information, particularly in view of the fact that the transaction is one made more or less in the dark. Cancellation provisions that proved useful in one case[3] gave the party contracting to use a secret process the right to cancel under the following conditions:

1. At any time within one year. 2. At any time after one year on six months' written notice. 3. At any time without notice in case (a) the licensor fails to obtain allowance of patent, (b) the secret process shall become known and used by a competitor, or (c) the licensor fails to supply the necessary raw material as set forth in the special purchase agreement executed in this particular case.

WHO MAY OBLIGATE USER

In a suit for compensation for the use of secret information, it is not a satisfactory defense to say that the disclosure was made to a foreman or workman of the company. It is true that only an official of the company or some one specially authorized may obligate the company. Yet the use of the information by the company, at some time necessarily with the knowledge of one who is employed to make contracts for the company, binds the company to make proper compensation. It is not material, therefore, whether the disclosure initially was to an official or to a workman.

These points are well illustrated in a 1946 decision by Judge Clark[4] of the 2nd Circuit Court.

In this case an immigrant stevedore

of a large steamship company demonstrated, to a pier agent of the company, an invention in loading and unloading cargoes, to make stevedoring more economical and less hazardous. The agent offered to pay a third of the savings realized from use of the invention. Twenty-four of the machines were built and used successfully.

Repeated requests to the pier agent by the inventor for compensation were answered, it was alleged, with the statement that payment would be made later.

In the meantime and subsequent to the original disclosure to the agent, the inventor applied for and received two patents on the invention.

The executive vice-president of the company visited the pier at least once a week, saw the machines in operation, and spoke with the inventor. In another manner also, the company may be assumed to have had official knowledge of the use of the invention; the pier agent who made the arrangement with the inventor originally was advanced to the post of chief of operations and then continued use of the device.

Some time later, the stevedore inventor was dismissed from the company. Then he sued not for patent infringement but for compensation for use of the invention disclosed in secret. The validity of the patents was not in issue.

The Court held, wholly apart from the original understanding made by one not at that time in position to make a contract for the company, that the later use of the invention by the company, with knowledge of a responsible official, constituted an acceptance by the company and obligated it to pay reasonable damages.

PREREQUISITES FOR LIABILITY FOR USE

Newness of the information to the one receiving it is important as a first circumstance bearing upon liability.[5]

Newness to the one receiving the idea seems to be held generally to be sufficient, even though the idea submitted may not be new to other members of the public. It is sufficient for recovery ordinarily if A has an idea, B does not have it and wants it from A, and B receives the idea from A and uses it.[1] The obligation is strengthened if there has been some negotiation resulting in an agreement to pay for the suggestion when and if used. Previous use of the exact idea, if it is to be considered not new, must usually be by the one to whom it is disclosed. Previous publication in a patent is ordinarily sufficient proof of lack of novelty. Use by a third party or having in the library a volume containing the idea is not sufficient to negative newness.

EFFECT OF ISSUANCE OF PATENT

The liability for use of information received in confidence and later appearing in a patent to the one who imparted the information may be considered under three different classes of circumstances.

The first circumstance involves the question whether the liability continues after the patent claiming what was disclosed has been held either invalid or not infringed. On this the several Circuit Courts are not in agreement. The 2nd Circuit holds that, in the absence of an explicit contract, there is no continuing liability.[8] The Court states its position, as well as the opposing view, in a decision involving a patent on lubrication and cooling of radial engines, as follows:

> As a general principle a patentee dedicates or surrenders all that he discloses except so far as the claims reserve it. The question has several times arisen whether if he has imparted the disclosure to another under an implied promise not to use it—i.e., "in confidence"—he may hold the promisor after the patent issues. Clearly he should be allowed to hold him for any breach during the period between the imparting of the secret and the issue of the patent. And the Sixth and Seventh Circuits have held that he may also hold him for a breach after issue on the notion that although issue puts the disclosure in the public demesne whether the patent be valid or not, the promisor has surrendered his privilege as a member of the public . . . No doubt the parties may agree if they wish that the promisor shall not use the disclosure, should the pending patent issue but turn out to be invalid. Indeed, they might even agree that he shall not use it even if the patent proves valid; e.g., the patentee might wish more than seventeen years' protection. But the expression of such an intent should be explicit, for in most cases the applicant will not need protection unless the patent does not issue, or if it does, only while its issue is undetermined. The promisor should not be held to an interpretation extending the agreement to the possibility that the patent may prove invalid, because the applicant is proposing to broadcast the invention to the world at large, reserving as his protection only the claims which he may secure; and there is ordinarily no reason to suppose that he means to exact any greater protection against the promisor than he will have against others.

The second circumstance is that in which there is claimed the disclosure of something in addition to what was included in the application for patent. The information omitted from the application must, first of all, be novel and it must also be used by the one receiving the information if he is to be held liable under any circumstance. Conclusive proof of the disclosure is necessary also; the courts are inclined to be critical of allegations of additional disclosure, on the ground that an application filed near the time of the disclosure may be given more weight than oral testimony, often from memory years later, as to what the applicant at the time had invented.

The third set of circumstances is that in which the patent that issues discloses but does not claim the information which is the subject of the agreement for use of confidential information. Here the courts have a diversity of opinion. On the principle that what is published in a patent but not claimed is dedicated to the public, one circuit court may hold that the dedication and attendant right to free use extend to the one who previously agreed to pay for such information. Another circuit court may hold that dedication to the public generally does not set aside the previously made private agreement.

These examples of lack of uniformity in interpretation of the law emphasize the desirability of stating explicitly in the agreement for secret information what the rights of the parties are to be under these various classes of circumstances that may arise.

AMOUNT OF COMPENSATION

The amount of compensation recoverable for use of secret information is that which was agreed upon in advance, if there was an explicit agreement on the point between responsible parties. In the absence of such agreement between those having the right to obligate both parties, the amount recoverable will be what is reasonable under the prevailing conditions.

Between these two sets of circumstances, there is a twilight zone in which disagreement exists as to whether there was or was not a contract as to the specific compensation.

If any general statement were to be made as to what constitutes reasonable compensation for the use of secret information there would be hazarded the estimate that it is ordinarily of about the same order as royalty paid for the use of patented inventions. In one case on this point, it was held in fact that "the same royalties or profits" should be charged for the use of information received in confidence before the patent issues as for damages after the patent issued.[9]

REFERENCES

1. For a good discussion of the law on this subject, see *Brown*, 29 J.P.O.S. 161. Information from this article has been restated and used at this point.
2. *Vulcan Corp. v. International Shoe Machinery Corp.* 71 U.S.P.Q. 310.
3. *Kraus v. General Motors Corp. et. al.*, 49 U.S.P.Q. 619.
4. *Matarese v. Moore-McCormack Lines, Inc., et al.*, 71 U.S.P.Q. 311.
5. *Soule v. Bon Ami Co.*, 235 N. Y. 609.
6. *Gilbert v. General Motors Corp.*, 51 U.S.P.Q. 181.
7. *de Filippis v. Chrysler Corp.*, 72 U.S.P.Q 288.
8. *Picard v. United Aircraft Corp.*, 128 F. (2d) 632. See also *Pennington Engineering Co. v. Houde Engineering Co.*, 57 U.S.P.Q. 422; *Rosenthal v. Celanese Corp.*, 57 U.S.P.Q. 291.
9. *Kelley-Koett Mfg. Co. v. McEwen*, 53 U.S.P.Q. 586.

The above article is based on Chapter 18 of "Patent Practice & Management for Inventors and Executives" by Robert Calvert, published February, 1950, by Scarsdale Press, Scarsdale, New York.

A CI REPORT ON

NEWER SYNTHETIC FIBERS

by W. P. ter HORST

Many synthetic fibers have been introduced during the past decade, and others are coming along. Here's a comprehensive summary of their properties and prospects.

THE TEXTILE industry is second in size only to the agricultural and food industry; large tonnages of inorganic and organic chemicals are consumed not only in manufacturing synthetic fibers, but also in processing, dyeing and finishing all fibers.

Natural textile fibers—such as cotton, wool and silk, the semi-synthetic fibers—like rayon and acetate, and the all-synthetic glass fibers and nylon are facing competition from a number of newer synthetics: polyethylene fibers, acrylonitrile-containing fibers (Vinyon, Dynel, Orlon), vinylidene chloride (Saran), polyglycol terephthalate (Terylene) and semi-synthetics such as the proteins (Caslen, Ardil, Vicara) and alginates.

Total U. S. A. fiber consumption in 1948 was close to 7 billion pounds. Of this cotton supplied 57.4%, rayon 14.9%, wool 10%, jute 10.3% and all synthetics combined, other than rayon, 1% or only some 70 million pounds. Of the latter, 65.8 million pounds was continuous filament yarn. This figure includes the older, well-known synthetic fibers, glass fiber and nylon, and some of the newer synthetic fibers that are within the scope of this article. Accurate production figures are not available. The best estimates for 1949 are:

Fiber	*Production (millions of lbs.)*
Nylon	75
Fiberglas	10
Saran	11
Vinyon	3

Among the fibers that have recently been placed on the market are polyethylene fibers, Vinyon, Dynel, Saran,

AS FOR THE FUTURE . . .

SYNTHETIC fibers have won a permanent place in our textile economy, and there is no question but that their use will increase rapidly. But significantly, they currently account for less than 2 per cent of U.S. textile poundage and less than 5 per cent of total value. Even a fivefold expansion, then, would still leave synthetics "small potatoes" compared to the natural fibers—cotton, wool, and jute—and the semi-synthetic, rayon.

Can fivefold expansion (to half a billion lbs. annually) be envisioned? It depends a lot on price, for at present price levels the synthetics are pretty well limited to specialty and luxury applications.

The new synthetics are inherently high-priced. First of all, there's the research expense, often amounting to millions of dollars for a single development. Then there's a large plant investment—estimated at $4 per lb. of annual capacity for a completely integrated nylon plant as against 85¢ for acetate rayon. Large power requirements, depreciation and maintenance of process equipment, and technically trained help to supervise relatively complex manufacturing operations are all cost-hiking factors.

Meanwhile natural fibers are not standing still, technologically speaking. Higher yields per acre, mechanical picking, and such scientific aids as chemical defoliants all tend to lower cotton production costs. Any material reduction in the cost of producing synthetics is likely to be matched by technology-inspired cuts in the cost of natural fibers.

Nevertheless, the synthetics can successfully invade many areas of textile use. Nylon has pretty well saturated the hosiery market, but expansion is foreseen in knit goods and staple. A major market for expansion is cord for heavy-duty tires. Tire cord alone accounts for half a billion lbs. of fiber annually, but high-tenacity rayon is a strong competitor.

Vinyon was brought to the market about the same time as nylon, but has found fewer uses. Certain of its properties make it a possible threat as a competitor in the hosiery field, however, which would offer room for considerable expansion.

Saran's future seems to lie largely in the automobile seat-cover field, an estimated 40-million-lb. annual market. Lack of metal boomed Saran screening during the war, but a shrinking market is foreseen except in humid areas where steel screens rust.

Orlon will probably find its largest initial use in "outdoor" fabrics, but its versatility marks it as a strong competitor of nylon as well as of wool and rayon. Substantial production is foreseen in a few years' time.

Dynel (formerly Vinyon-N) has definite advantages over Vinyon in many applications, so some expansion is likely. Similarly, Vicara has many advantages over previous synthetic protein fibers and may find increasing outlets as a substitute for or a blending fiber with wool. Glass fiber fabrics may expand considerably in the curtain field.

Other new fibers are too far in the future to admit any appraisal of their potential importance.

In short, synthetic fibers have arrived at the point where they're competing among themselves as well as with the older materials. —THE EDITORS.

Orlon, Terylene, Ardil, Vicara, Caslen and alginate fibers.

These fibers are being accepted by the textile industry—in full realization of the improvements that are continually being made in cotton, rayon, wool, glass fibers, nylon, and silk—because they possess outstanding characteristics or a combination of properties not possessed by the other fibers.

To a considerable extent these fibers compete with one another, cost-wise, qualitywise or both.

WHY MORE FIBERS?

There is no universal fiber. Each fiber has desirable and undesirable properties, and often properties that are deemed to be undesirable for general textile uses can be exploited for specialty uses; for example: In general a low softening point is undesirable, yet Vinyon is used for that very reason in tea bags and other heat-sealing fabrics. In general, solubility in water or dilute alkali is undesirable, yet alginate fibers are used for that very reason.

Fiber properties contribute much toward the properties of a fabric but they are not the sole criterion; other factors such as yarn and fabric construction and type of finish play important roles.

While the tensile strength of a textile fiber is important, not much is gained by increasing the strength beyond the ability to safely withstand the conventional textile operations on the cotton, woolen or worsted systems.

Adequate wet strength is important: spinning, knitting and weaving are done at high humidities; and practically all textile processing such as sizing, desizing, scouring, bleaching, dyeing and laundering are done wet. Properties as important as adequate tensile are crimp; elongation at break; resistance to deformation; elastic recovery; rate of recovery; creep; crease resistance; moisture absorption; bleachability; dyeability; resistance to sunlight, abrasion, fatigue, dry cleaning solvents, chlorine and to chemicals in general; and the all important "hand".

Cotton is in demand because it is strong both dry or wet, durable, launderable, and relatively low in cost; 15/16 inch staple, middling, costs 30¢ per pound. Egyptian cotton, which is just a little longer and finer, may cost as much as $1.15 per pound. On the other hand, cotton is not resilient, deteriorates on prolonged out-door exposure and does not resist acids.

Viscose rayon in staple form costs 35¢ per pound and as continuous filament yarn from 71¢ to $1.02 per pound depending upon the fineness. Its wet strength is less than the dry strength,

it is less durable than cotton, must be laundered and ironed with caution, and is not very resilient.

Acetate rayon in staple form costs about 42¢ per pound and in yarn form 66¢ to 92¢ depending upon the fineness. It is more resilient than viscose, has good sunlight resistance. On the other hand it is weaker than viscose, has a lower softening point, is affected by certain organic solvents, and has a tendency to creep.

Wool, like cotton, is available in staple form only. Fine staple, clean basis, costs $1.52 per pound. Wool is resilient, durable, warm, and shape-holding. It will felt and has a high moisture absorption. On the other hand wool tends to shrink on laundering, is difficult to bleach, turns slightly yellow in sunlight, and is scratchy—at least in the coarser grades.

Glass fibers cost 47¢ to $1.32 per pound in staple form and from 41¢ to $2.15 in yarn form, depending upon the fineness. They are very strong, stiff, chemically inert, show high dielectric strength, will not burn. On the other hand they lack resiliency and abrasion resistance, and are difficult to dye and not suited for wearing apparel.

Nylon costs $1.60 per pound in staple form and from $1.95 up to $5.75 per pound in yarn form, depending upon the fineness. Nylon is strong, has excellent elastic recovery, is quick drying (low moisture absorption), needs no ironing after laundering. On the other hand nylon deteriorates on prolonged outdoor exposure, has a tendency to creep and is affected by acids.

Rubber threads cost from $1.00 to $3.00 per pound in yarn form from $1.50 to $4.50 per pound. Their main virtue is long-range elasticity. On the other hand they deteriorate with age and tend to swell in certain organic solvents.

This brief summary explains why there is a market for new fibers with special properties since no existing fiber is without shortcomings.

NATURAL FIBERS

The natural fibers are based on cellulose, proteins or silicates as shown in Table I:

Much work is in progress to improve their properties: wool can be made shrink-resistant; cotton can be made resistant; and cotton felts have recently been produced without the aid of wool or a binding agent. Short staple wood fibers are on the market under the trade names Polycel and Solka. A domestic shrunk staple linen fiber is being produced under the trade name Sativa. Asbestos fiber is being used in combination with cotton under the trade name, Asbeston.

TABLE I: NATURAL TEXTILE FIBERS

Cellulose Base	*Protein Base*	*Mineral Base (Silicates)*
Cotton	Wool	Asbestos
Flax	Silk	
Hemp	Fur	
Ramie	Hair	
Jute		
Kenaf		
Kapok		
Milkweed		

SEMI-SYNTHETIC FIBERS

These are based on cellulose, proteins, minerals or metal and rubber, as shown in Table III.

Improvements continue to be made in the older semi-synthetic fibers: rayon's tenacity has been greatly increased; Celsos is the trade name for a new fiber having desirable properties of both rayon and acetate; glass fibers can now be obtained in a wide variety of colors; the aging of rubber threads has been bettered; fine steel piano wire fabric shows promise in rubber tires, etc.

The newer semi-synthetic fibers comprise the alginate, carboxymethylcellulose, and protein fibers derived from casein, peanut protein or zein. Their essential properties are listed in Table II.

The average recurring unit in a typical carboxymethylcellulose is: Carboxymethylcellulose is soluble in dilute alkali and can be spun into yarns which serve the same purposes as alginates.

Some experimental work has also been done by Du Pont on polyvinyl alcohol fibers.

Trained as a chemical engineer, the author has been with the Industrial Rayon Corp., head of organic research for U. S. Rubber Co., manager of research and development and general manager of the fiber division of Virginia-Carolina Chemical Corp. and a consultant. He is now at the research laboratory of Mathieson Chemical Corp., P. O. Box 480, Niagara Falls, N. Y.

SOLUBLE FIBERS

Alginic acid is a polysaccharide derivative that occurs in seaweed. Alginate yarns were originally developed in England as substitutes for jute. The tenacity of the fiber is 2 grams per denier and yarns as fine as 50 denier can be spun.

The yarns can be supplied water-soluble or water-insoluble. The former type is rapidly dissolved in wool scouring solutions (soap and soda ash) and lends itself to novelty fabrics where the alginate fiber serves as a core or supporting thread and can later be dissolved out; it enables cloth constructions with twistless yarns and the manufacture of very fine worsted yarns and fabrics as light as 1¼ oz. per square yard.

The sale of these yarns is handled in this country by Lustre Fibers, Inc.

PROTEIN FIBERS

The recurring unit in proteins is $(—CONHCHR—)_n$. Proteins are high-molecular-weight, coiled-chain peptides; in silk R is small (hydrogen or methyl); in wool R is bulky and may exceed the molecular weight of the polypeptide chain. Protein fibers possess long-range elasticity. Casein fibers are old. Production of Lanital was begun in Italy by Snia Viscosa before the war, was interrupted by the war, and is now again being manufactured. Manufacture of a casein fiber, Aralac, in this country ceased early in 1948.

Relative newcomers to this field are Ardil and Fibrolane in England, Caslen and Vicara in America.

Ardil is being promoted by Imperial Chemical Industries. The problems of growing peanuts in East Africa were greatly underestimated and until an adequate supply of peanut meal of a grade suitable for fiber making becomes available, no large-scale applications of Ardil are in sight. Its main uses are expected to be in blends with other fibers. Approximately the same situation exists with Fibrolane, Courtauld's peanut protein base fiber.

Caslen is the only casein fiber now being produced in America. It is made by Rubberset Co. It shows promise for use in upholstery and mattresses and is supplied for those applications in rather heavy deniers. Its permanent curl contributes much to the

TABLE II—SYNTHETIC AND

Trade Name	Tensile Strength	Specific Gravity	Softening Point	Price	Raw Material
Nylon	7–15,000 psi	1.14	320°F	$1.60 (staple) $1.95–$5.75 (yarn)	Adipic acid, hexamethylene diamine (from benzene, cyclohexane, or furfural)
Polyethylene	18–25,000 psi	.92	165°F	95¢	Ethylene
Vinyon	77,000 psi	1.35	Low	$1.00 (staple) $1.50–$3.00 (continuous filament)	Ethylene and chlorine or acetylene and HCl
Saran	15–40,000 psi	1.68–1.75	260°F	67¢–$1.15	Ethylene and chlorine
Orlon	4 g/d tenacity	1.18	About 450°F	$2.75–$3.25	Acrylonitrile (HCN and ethylene oxide)
Dynel	Up to 5.5 g/d tenacity	1.26	275°F	$1.25 (continuous filament)	See Orlon and Vinyon
Terylene Dalvon					Para-xylene or paracymene to produce terephthalic acid and ethylene to produce glycol
Alginate Yarns	Low			$2.39–$3.25 (yarn)	Seaweed
Cellulose Gum (CMC)		1.6			Cellulose and chloroacetic acid
Caslen		1.29		94¢ (staple)	Casein
Ardil Fibrolane	Low	1.25		Staple about 50¢ per pound in England	Peanut-protein
Vicara	Low	1.25		83.2¢	Zein

resiliency that is claimed for it. Production of a straight staple and of continuous filament is contemplated.

Production of Vicara, a fiber derived from zein, was started in 1948 by Virginia-Carolina Chemical Corp. Acceptance by the textile trade has been slow. It is being offered as a partial wool replacement and will have to compete not only with the lower grades of wool but also with Orlon, which is far stronger, and Dynel.

This is true for all the regenerated protein fibers, and in view of their high price, it is doubtful whether large uses in textile fabrics in this country will be found.

ALL-SYNTHETIC FIBERS

The all-synthetic fibers that are beyond the laboratory stage of development are also listed in Table II.

The chemistry of synthetic fibers is simple. The organic fibers may be aromatic such as Terylene or aliphatic. With the exception of the Nylon group, all aliphatic-type fibers are high-molecular-weight polyethylene or substituted polyethylenes.

In Vinyon, one hydrogen atom is replaced by a chlorine atom: $(—CH_2CHCl—)_n$. In Saran, two hydrogen atoms on the same carbon atom are replaced by two chlorine atoms: $(—CH_2CCl_2—)_n$. In Orlon, one hydrogen atom is replaced by a cyano group: $(—CH_2CHCN—)_n$. In Dynel, one hydrogen atom is replaced alternately by a cyano group and by a chlorine atom: $(—CH_2CHCNCH_2CHCl—)_n$. In polyvinyl alcohol, one hydrogen atom is replaced by the hydroxyl group: $(—CH_2CHOH—)_n$.

TABLE III: SEMI-SYNTHETIC TEXTILE FIBERS

Cellulose Base	*Protein Base*	*Mineral Base*	*Rubber Base*
Viscose rayon	Casein	Glass	Natural rubber
Cuprammonium rayon	Peanut protein	Aluminum	
Acetate rayon	Zein	Steel	
Alginates*			
Carboxymethylcellulose			

* Alginate fibers are not based on cellulose, but on closely related alginic acid, a polysaccharide.

SEMI-SYNTHETIC FIBER SUMMARY

Producers of Raw Material	Fiber	Current Production	Outstanding Characteristics	Limitations
Du Pont Co.		Large	Strong; high elastic recovery, quick drying, no ironing required. Applications: hosiery, shirts, lingerie, blends	Deteriorates on long outdoor exposure; tendency to creep; affected by acids
Bakelite Corp. Du Pont Co.	American Viscose Corp., Reeves Bros., National Plastics Products Co.	Substantial	Light; tough; elastic; low water absorption; inert; abrasion-resistant. Applications: screening, seating fabrics, filters	Low softening point; hard to dry; affected by solvents
Carbide & Carbon		Substantial	Chemically inert; elastic; low moisture absorption; sunlight-resistant; high wet strength. Application: work clothing, heat sealing fabrics, fish nets, worsteds	Low softening point; deterioration by solvents
Dow Chem. Co.	National Plastic Products Co., Firestone Industrial Products Co., Goodyear Tire & Rubber Co.	Large	Chemically inert, tough, abrasion resistant, easy to clean. Applications: screening, shoes, handbags, upholstery, draperies, seat covers	Difficult to dye; brittle when cold; low softening point, affected by solvents
Du Pont Co.		Limited, will expand in 1950	Good hand, shrink-resistant, exposure-resistant. Applications: rainwear, sewing thread, outdoor fabrics, fish nets, worsteds	Difficult to dye, attacked by alkali, fair abrasion resistance
Carbide & Carbon		Limited	Resilient, dries quickly, dyes readily, shrinkproof. Applications: blankets, work clothes, hose, draperies, carpets	Cannot be bleached to a pure white
{Imperial Chemical Industries, Ltd. Du Pont Co.}		Limited in England; experimental in U. S.	Resilient; resistant to light, solvents; heat-settable; low moisture absorption. Applications: screening, outdoor fabrics, filters, staple blends, rainwear	Difficult to dye, attacked by alkalies
Scottish Sea-Weed Industries	Courtauld's Ltd.	Limited	Soluble in dilute alkali, can be precipitated with heavy metal salts. Applications: scaffolding; novelty fabrics	Weak
Hercules Powder Co. Du Pont Co.		Substantial	Same as for alginates	
Regular trade channels for carein	Rubberset Co.	Limited	Resilient, permanently curled. Applications: replaces horsehair in upholstery; used in automobile filters	Not yet available in fine deniers. Softening point 212°F
{Imperial Chemical Industries, Ltd. Courtauld's Ltd.}		Limited	Resilient; soft hand; high moisture absorption; dyes with acid dyes. Wool-like properties. Applications: in blends	Weak; low wet strength. Heavy deniers and continuous filament not yet available
Com Products Refining Corp.	Virginia-Carolina Chemical Corp.	Limited (capacity 2,500,000 pounds per year)	Do.	Do.

The organic synthetic fibers listed are all made by addition polymerization except Nylon and Terylene, which result from condensation polymerization.

The inorganic synthetic fibers and yarns are based on a special glass, a polysilicate having the approximate composition $3MgO,2SiO_2$, or on aluminum or steel.

Improvements are continually being made in the older synthetic fibers. Glass fibers, introduced in 1936, are being manufactured by two concerns: Fiberglas Corp. and Glass Fibers, Inc. They are now available in a large variety of colors.

Nylon type 66 fibers, introduced in 1939, can be heat-set to improve dimensional stability. The aluminum yarns, produced by Reynolds Metals Co. and Aluminum Co. of America, are coated with cellulose acetate to facilitate dyeing.

POLYETHYLENE FIBERS

Polyethylene fibers are structurally the simplest of the newer fibers. They are also the lightest man-made fibers and the youngest. The reason that this class was not developed earlier is that high-molecular-weight polyethylene, a British development, was not available.

Paraffin is a polyethylene of low molecular weight and has a low melting point. By increasing the molecular weight of polyethylene, fiber-forming properties appear, together with toughness and abrasion resistance, and the softening point is increased somewhat.

Polyethylene resin is produced from ethylene by Du Pont Co. and Bakelite Corp. by high-pressure polymerization. Current production of polyethylene fibers is limited. Polyethylene monofilaments are produced by American Viscose Corp., Reeves Bros., Inc., and National Plastics Products Co.

In the fiber-making process, monofilaments are extruded at temperatures from 450° F upward, hot- and cold-drawn about 550°, and annealed.

Polyethylene fibers float on water, impart high bulking power in fabrics. Abrasion resistance, toughness, dielectric strength are high, elasticity is good, water absorption low. They are inert to most chemicals, burn slowly, are readily cleaned with soap and water. The hand is waxy. Applications are found in screening, seating fabrics, and filters.

The fiber has limitations: The soft-

ening point is low, 165° F, residual shrinkage in fabrics is therefore high. (Heat stabilization helps.) The fibers do not dye readily and are usually supplied in standard colors. They are affected by toluene and chlorinated solvents, hydrocarbons at elevated temperature, and are slightly swollen in gasoline at room temperature.

VINYON, SARAN

The Vinyon fibers are copolymers of 90% vinyl chloride and 10% vinyl acetate.

The resins are produced by Carbide and Carbon Chemicals Corp. and Vinyon filaments and staple fibers by American Viscose Corp. Current production is substantial.

The resin is dissolved in acetone to 25% solids, and the solution is spun as in acetate rayon.

Chemical inertness, especially to acids and alkalis, gasoline and oils, is one of Vinyon's outstanding characteristics. It also has good elasticity, low moisture absorption, and good sunlight resistance. As strong wet as when dry, the fiber will not support combustion.

These properties have made Vinyon useful in heat-sealing fabrics, workmen's clothing, filter cloths, smoke bags, valve packings, and fishing lines.

Among its limitations are low softening point, and deterioration by ketones, esters, chlorinated hydrocarbons, aromatic hydrocarbons, and carbon bisulphide.

Dow Chemical Co. produces Saran resin (polyvinylidene chloride), and monofilaments are spun by The National Plastics Products Co., Firestone Industrial Products Corp. (trade name: Velon), and Goodyear Tire and Rubber Co. Current production is large.

Chemical inertness, good resistance to abrasion, toughness, high dielectric strength, ease of cleaning, low water absorption, good fatigue life, and self-extinction of flame are its desirable properties.

Saran is being used in screening, handbags, shoes, hats, upholstery, seat covers, appliance cords, and draperies.

Saran's limitations are that it is affected by chlorine, ammonia (discolors), cyclohexanone, and dioxane; is not readily dyed; becomes brittle below 0° F; and has a low softening point.

ORLON, DYNEL

Polyacrylonitrile is not new, but fibers made from it are. Special solvents had to be developed for the polymer, such as dimethylformamide. Spun from solution, it is now being produced as Orlon on a limited scale by the Du Pont Co. Commercial scale production is planned during the second half of 1950.

Carbide and Carbon Chemicals Corp.

Dynel work clothes resist most of the destructive chemicals used in industry.

Orlon appears to have many of the properties of nylon, is better in some respects, less desirable in others. Orlon has a good hand and its elastic behavior is like wool. It has good dimensional stability at high humidity; long flex-life; and resistance to acids, chlorine, and prolonged outdoor exposure. The resistance to abrasion, while not as good as that of nylon, is still satisfactory.

Industrial uses such as sewing threads, rainwear, fabrics to resist outdoor exposure, fish nets, and worsted fabrics are foreseen.

Its dyeability needs to be improved. Resistance to alkalis is fair. Orlon can be mercerized and vat-dyed, but not kier-boiled.

Dynel, formerly Vinyon-N (polyacrylonitrile-polyvinyl chloride), is produced by Carbide and Carbon Chemicals Corp. Current production, as continuous filament, is limited. Staple production is limited now, but will be substantially increased by the second quarter of 1950. The fiber is made by solution spinning.

Dynel's acceptance is due to the fact that it is resilient, resistant to combustion, dimensionally stable in boiling water, resistant to acids and alkalis, has low moisture absorption (dries quickly), dyes readily with acetate colors, and is not adversely effected by low temperature.

The fiber is used in blankets, work clothing, sweaters, men's hose, draperies, carpets, and bathing suits.

The fiber is thermoplastic and as yet cannot be bleached to a pure white.

REPRINTS

Reprints of this report are available at 50 cents per copy. Special prices will be quoted on quantities of five or more mailed to one address. Send requests to Editorial Department, Chemical Industries, 522 Fifth Ave., New York 18, N. Y. Remittance must accompany order. Stamps acceptable.

TERYLENE, PERLON

Terylene fibers, originally developed by British Calico Printers, are high-molecular-weight, linear polyesters made from terephthalic acid and ethylene glycol by condensation polymerization. Their development was retarded because of the unavailability of terephthalic acid until recently. It is made by Imperial Chemical Industries. Du Pont is making it experimentally under the trade name Delvon. Current production is limited.

Terylene is reported to be superior to other synthetics in many properties for specific end uses.

Polyurethanes (—CHRNHCOOCH$_2$ CH$_2$OCONH—)$_n$ were developed in Germany under the name Perlon and prepared from di-isocyanates and glycols by addition polymerization. Polyurethane fibers are not available on the American market.

NEW ONES UNLIKELY

It appears that the array of natural, synthetic and semi-synthetic fibers now available to the textile technologist will satisfy the present and foreseeable needs of the consuming public. Our peacetime economy likely cannot absorb many more radically new fibers—particularly in view of the improvements that are continually being made, costwise and qualitywise, in the existing fibers and the tremendous expense involved in developing and marketing new fibers. Fiber consumption as a whole will increase, of course, because the world's population is increasing at the rate of 50,000 per day and—at least in the United States—incomes and consumption levels are improving and industry requires larger quantities of fabrics.

All told, the number of commercially available textile fibers, natural, semi-synthetic and all-synthetic, is about thirty. Many of these are available in various grades, in staple form, as multifilaments or as monofilaments, in different deniers, crimped or straight, lustrous, semi-dull or dull. The textile technologist already has at his disposal a large number and variety of fibers to construct his yarns and fabrics and as mentioned above, it will become progressively more difficult to promote new fibers in our economy.

Place Cyanamid ON YOUR *APPROVED* "LIST OF SUPPLIERS" for these four products...

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The ideal plasticizer for use in vinyl resin films of all types because of its:

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- Low vapor pressure
- Light color
- Good compatibility

2. AERO* PHTHALIC ANHYDRIDE

For use in the manufacture of phthalic alkyd resins, chemical plasticizers (phthalate esters), vat dyes and phthalocyanine pigments.

- Free-flowing, clean, white flakes
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For use in the manufacture of coating resins—contributing importantly to color retention, chemical resistance, and drying speed. For use in plastics, laminating resins and printing inks—capable of reactions by condensation and addition polymerization, as this acid has the advantages of being highly functional.

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☐ AERO FUMARIC ACID ☐ MALEIC ANHYDRIDE

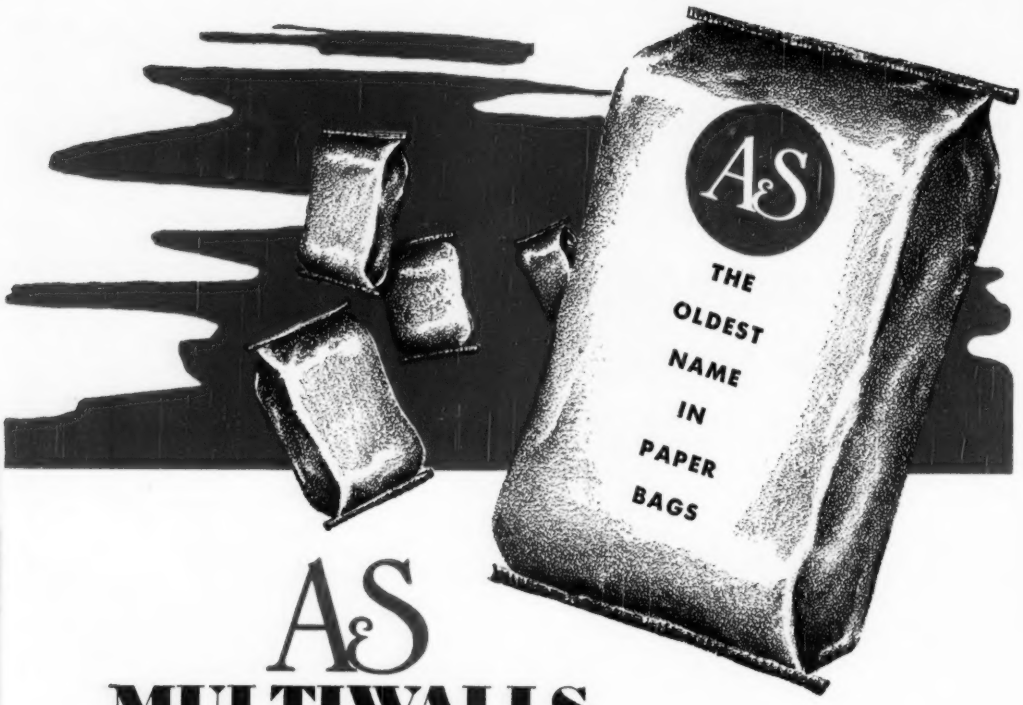
Send sample(s) of.....

Name.....Position.....

Company.....

Address.....

City.....State.....



A&S MULTIWALLS *stand* UP *and* OUT!

RECENT DEVELOPMENTS FROM THE A&S PACKAGING LABORATORY

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  Palletized shipments of A&S bags lower your handling costs, minimize storage space.
- **STA-STAK BAG**
  Creped outer wall takes skid and slip out of stacking. Greater resiliency, easier handling.
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  Ingenious bag valve assures less dust when packing — less sifting when packed — prevents waste.
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  Polyethylene lined, moisture-proof protection for hygroscopic materials with exclusive "Electro-Seal" bottom closure.
- **SUPER GLOSS FLOUR BAG**
  Toughest of flour bags is bright white with brilliant inks to provide sparkling, appealing shelf packages.
- **ARK-TONE PRINTING**
  Sharp, clear color process combines perfect reproduction and brightness for consumer packages.
- **HI-TONE PRINTING**
  Strong, deep colors for sugar, salt, rice and similar bags.
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  Bags are packed under pressure. Saves 50% of customers' space allotted to storage.

● A&S Multiwall bags *stand up* under all kinds of shipping and storing abuse, because every ply is made of No. 1 specification kraft, and every bag must pass the rigid A&S spot inspections.

A&S Multiwalls *stand out* because they are printed on modern 4-color presses that reproduce a bag design in eye-arresting colors unsurpassed in commercial bag printing. Why not have our A&S packaging specialists analyze your packages? These men know how to build impact into the flat exterior of what could otherwise be a dull and unimaginative package. This combination of unusual design and faultless printing is yours at no extra cost.

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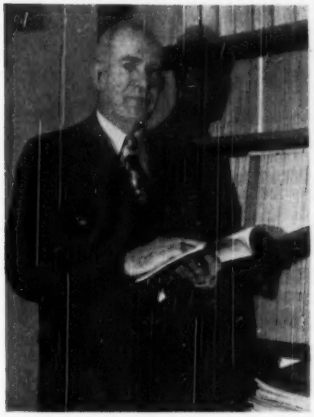
THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

PEOPLE



MAURICE C. TAYLOR, who has organized laboratory research facilities for general consultation at Niagara Falls (see page 604).

HARRY B. McCLURE, vice president, Carbide and Carbon, has been presented the Commercial Chemical Devel. Assn. 1950 Honor Award.

CHARLES W. DEAN, recently appointed general engineering manager, Lever Brothers Co.

CARL SHIPP MARVEL, authority on synthetic rubber, who will receive the Willard Gibbs Medal presented by the Chicago section of the American Chemical Society on May 19.

HAROLD F. MERRITT (left), named executive vice president of the Solvay Sales Division, Allied Chemical & Dye Corp.

THOMAS B. RICHEY, Jr., named production manager, N. I. Malmstrom & Co. He has been with Du Pont for ten years.

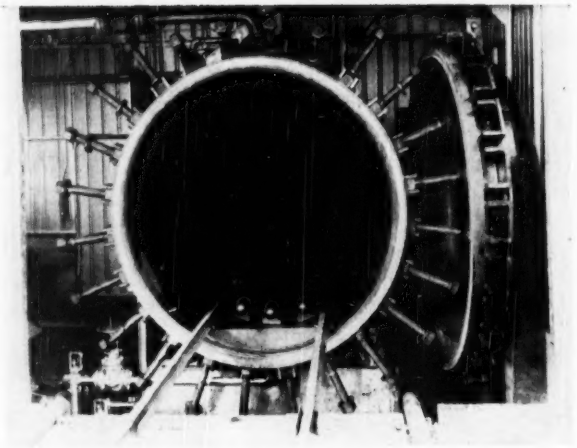
SAVES SMALL LOTS

Wood treating plant is especially designed to handle small orders.

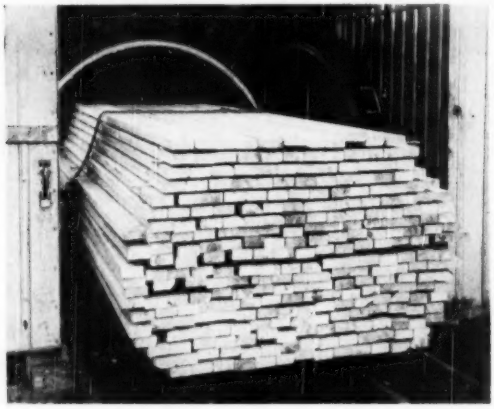
A plant "tailored" to chemically treat small lots of lumber against decay and termites has been completed in St. Louis by the Associated Wood-Preservers, Inc. It is designed to make chemically preserved lumber immediately available to home builders through lumber dealers.

The chemical used is pentachlorophenol, supplied by nearby Monsanto Chemical Co., which is water-insoluble and highly toxic to wood-attacking organisms and insects. When properly applied it will not discolor wood or affect its painting and puttying.

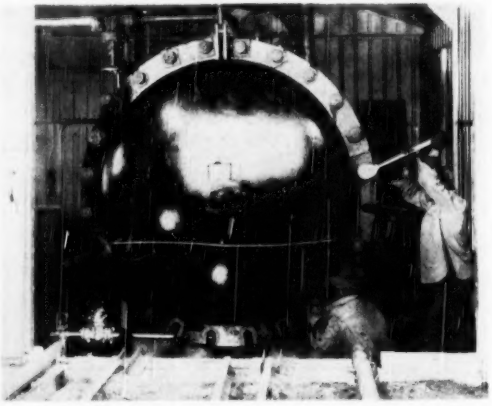
Treating wood by vacuum and pressure is not new, but commercial treating plants as a rule are not equipped to handle small orders. It is estimated that framing and superstructure for houses can be protected for as little as 3% of the total cost.



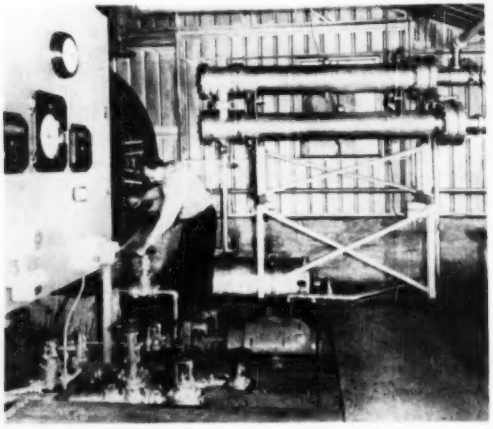
Core of the lumber treating plant, a thick walled horizontal cylinder resembling a huge pressure cooker. The cylinder is 72 inches in diameter and 36 feet long.



Lumber to be treated is loaded on trams and rolled into the cylinder, which has a maximum capacity of 7,500 board feet per charge.



The cylinder is filled with a solution of pentachlorophenol in light oil and electrically driven pumps force it into the wood's cells.



James Erwin, plant superintendent, introducing treating solution. A final vacuum application leaves the lumber surface dry and clean.

The treated lumber is stamped and shipped. The pentachlorophenol preservative protects it for a life-time against decay and termites.

Powco Brand

Allethrin*

The much-talked-about "synthetic pyrethrum" — really the allyl homolog of Cinerin I, a pyrethrum-*like* organic — is now available in limited quantities.

Industry's chemists and entomologists are continuing their tests of this new insecticide material. Large-scale production quantities probably will not be available until 1951.

Meanwhile, small quantities of this interesting and promising compound will enable you to try it out in your own formulations — become familiar with its properties — and thereby prepare yourself to take *full* advantage of it when larger supplies are available.

As always, our chemists and entomologists will work closely with you in developing your own formulations of POWCO BRAND ALLETHRIN.

For dependable progress in insecticide materials — look to Powell!

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DDT POWDERS AND LIQUIDS
CHLORDANE POWDERS AND LIQUIDS
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TETRAETHYL PYROPHOSPHATE

*Coined name suggested for allyl homolog of Cinerin I by Interdepartment Committee on Pest Control Materials.

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Front view of creep-testing apparatus. Test specimens are placed in the specially-designed furnaces and kept under a predetermined stress at constant temperature for long periods of time. Measurements are taken, usually by means of an extensometer, at regular intervals.

METAL BUSTER

Controlled creep and rupture studies supply data for equipment design.

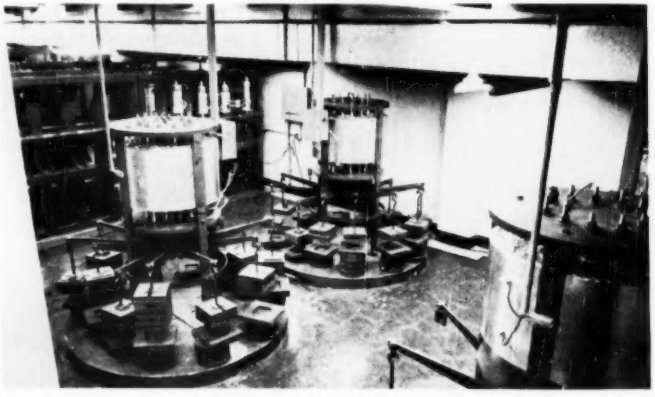
Recently, Babcock and Wilcox Co. has installed new equipment for creep and stress rupture studies at its new research and development laboratory at Alliance, Ohio. Twenty stations designed to test creep—the permanent deformation that occurs with time in metals subjected to stress at high temperatures—are available. The units are also usable for stress-rupture tests—overloaded creep tests continued to actual failure.

The units were moved from M. I. T., and multiple-circuit electronic controls have been applied to them. These make it possible to hold temperature within plus or minus one degree F up to 1550° F. A change of less than 0.00001″ in a 10″ test bar can be measured.

In addition, 16 single-station, lever-arm creep-testing machines have been installed. With these, a maximum temperature of 1800° F, with controls holding the temperature to plus or minus two degrees, is obtainable.

For stress-rupture studies, four 12-station units have been built at the laboratory. The furnaces are of annular design and each contains 12 circular chambers for the specimens. The temperature of each specimen is continuously recorded, and when a specimen ruptures the change in temperature serves to record the time of rupture.

Single-station, lever-arm creep testing machines. Test specimens of 3.0 inch gage length are used, and the accuracy of the reading is approximately fifty parts in one million.



Twelve station units for studying stress rupture characteristics of metals. Temperature uniformity from plus or minus 3° F up to 1500° F is regularly obtained in these furnaces.

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What is your detergent problem? Is it one of pricing...meeting and outmatching competition? Are you searching for the particular detergent that best serves *your* purpose? Do you require special formulations?

ULTRA's modern plant and staff of specialists are geared to handle unusual problems.

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Annual sales increased from 120,000 pounds to over a million within two years.

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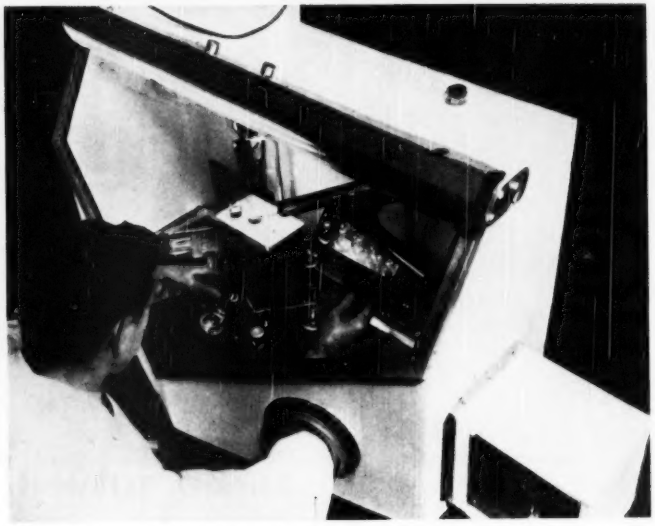

Miniature laboratory reduces danger of contamination in radioactive isotope experiments.

Glove box laboratories, made by the Radioisotope Applications Co., greatly reduce the cost of contamination control in experiments with certain radioactive isotopes. The plywood box and surgical gloves for the technicians' hands are sufficient to absorb low energy radiations from many radioisotopes. Practically an entire laboratory can be placed in a single box, since micro-techniques are used for many radio-isotope procedures.

FLUOROGASKETS

Gaskets made from Kel-F combine resiliency of rubber with high corrosion resistance.

More than a score of new chemical process applications for fluorocarbon thermoplastics take advantage of their chemical inertness and resiliency under destructive conditions.

Among them are lined hose and special, soft-pressed seal made from graphite, asbestos and Kel-F as centrifugal pump shaft packing, and Kel-F jacketed rubber gaskets.

NOW—Simpler, Faster, Automatic Titrations!

The BECKMAN Automatic TITRATOR

Here's another new Beckman advancement in instrumentation—*an instrument that runs your titrations for you.* It's the Beckman Automatic Titrator—the instrument that makes accurate titrations more rapidly and conveniently than by manual methods.

SIMPLE OPERATION: In a series of titrations, simply fill the burette, place the sample in the beaker—and the Beckman Automatic Titrator takes over from there. Raising the beaker holder into position automatically starts the stirrer motor and begins delivering titrating solution into the sample.

A special circuit electrically anticipates the approaching end point, scaling down delivery of the titrating solution in progressively smaller increments to assure a highly accurate titration. When the end point is reached, delivery of the titrating solution stops and a light shows completion of the titration—*all automatically and without attention from the operator.*

Whether your laboratory is large or small the Beckman Automatic Titrator provides important advantages in your titrating operations . . .

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- *It provides time-saving conveniences for sample handling.*

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QUICK, SIMPLE OPERATION—completes many routine titrations in only 1-1½ minutes—even titrations to 0.1% accuracy in 2½ minutes or less. Change of sample is simple, rapid—a single motion raises, locates and secures new sample in operating position.

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ROOM DEODORANTS

...INVESTIGATE THE PROFIT

11 *reasons why "genetron"* aerosol dispersants give BETTER results*

1. **NON-TOXIC** . . . Stainless, odorless; will not injure foods; harmless to fabrics and finishes.

2. **NON-FLAMMABLE** . . . Meet the exacting I.C.C. requirements.

3. **STABLE, CHEMICALLY INERT**..."Genetron" dispersants are non-corrosive to containers or valve mechanisms.

4. **COMPATIBILITY**. . ."Genetron" dispersants show broad versatility in formulation" with active ingredients.

5. **CORRECT VAPOR PRESSURE**..."Genetron" dispersants are designed to meet any vapor pressure requirement for insecticidal, fungicidal, germicidal, deodorant, etc. use. Ultimate in aerosol performance is assured at any vapor pressure up to 40 pounds p.s.i.g. at 70° F.

6. **GREATER VOLATILITY**... As much as 75% greater volatile constituents in "Genetron" dispersants release "energy" necessary for true aerosol efficiency. Permit use of lower pressures and greater flexibility in formulation.

7. **GREATER VOLUME**..."Genetron" dispersants offer as much as 20% greater liquid volume and 20% greater gas volume per unit of weight.

8. **GREATER AEROSOL EFFICIENCY**... Improved physical and chemical properties of "Genetron" assure better dispersion and greater efficiency of aerosol formulations.

9. **GREATER UNIFORMITY**... Less distillation effect . . . because "Genetron" dispersants were designed specifically for aerosol use, the desired aerosol vapor pressure, composition and performance are maintained more uniformly throughout discharge from the container.

10. **CORRECT PARTICLE SIZE**. . ."Genetron" dispersants help produce aerosols with a more ideal and uniform particle size.

11. **ECONOMY** . . ."Genetron" dispersants are shipped in one-ton cylinders and require less equipment, less refrigeration and less operational technique in discharging into the finished package.

PACKAGING NEED BE NO PROBLEM . . . FOR YOU!

So *important and promising* are aerosols in the field of consumer products, that major container manufacturers and fillers have large new plants from coast to coast ready to serve you. Expert assistance is available in producing *the kind of formulations you want . . . packaged under your label.* General Chemical, with its years of research and development experience in the field of aerosol dispersants, has extensive facilities available: first—in guiding you through initial stages of product development; second—in providing the proper "Genetron" dispersant compatible with the formula and its intended use.

If you are a manufacturer of any of the consumer products listed above . . . you *cannot afford* to disregard their potentials when packaged as aerosols. The field is growing fast! More newcomers are entering daily. Drawing on our experience now may give you the head-start you need in the competitive days ahead.

liquid, powder or cream form...

COSMETICS
Hand lotions—perfumes
—sun tan lotions—
personal deodorants

PROPRIETARIES
"Cold remedies"—
germicides—fungicides
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WATER REPELLENTS
For fabrics—wearing apparel

FIRE RETARDANTS
For fabrics

POTENTIAL IN "genetron" low pressure AEROSOLS!

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. . . When true aerosol performance is required—as in insecticides, germicides and deodorants—"Genetron" dispersants can give greater volatility, greater volume per given weight, and more uniform particle size.

. . . In specialized residual types, where higher percentages of active ingredients are necessary, "Genetron" dispersants allow a greater flexibility in formulation.

"Genetron" dispersants are available for all types of application . . . to meet every aerosol requirement—including household, agricultural, greenhouse and industrial.

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"GENETRON" DEVELOPMENT DEPARTMENT

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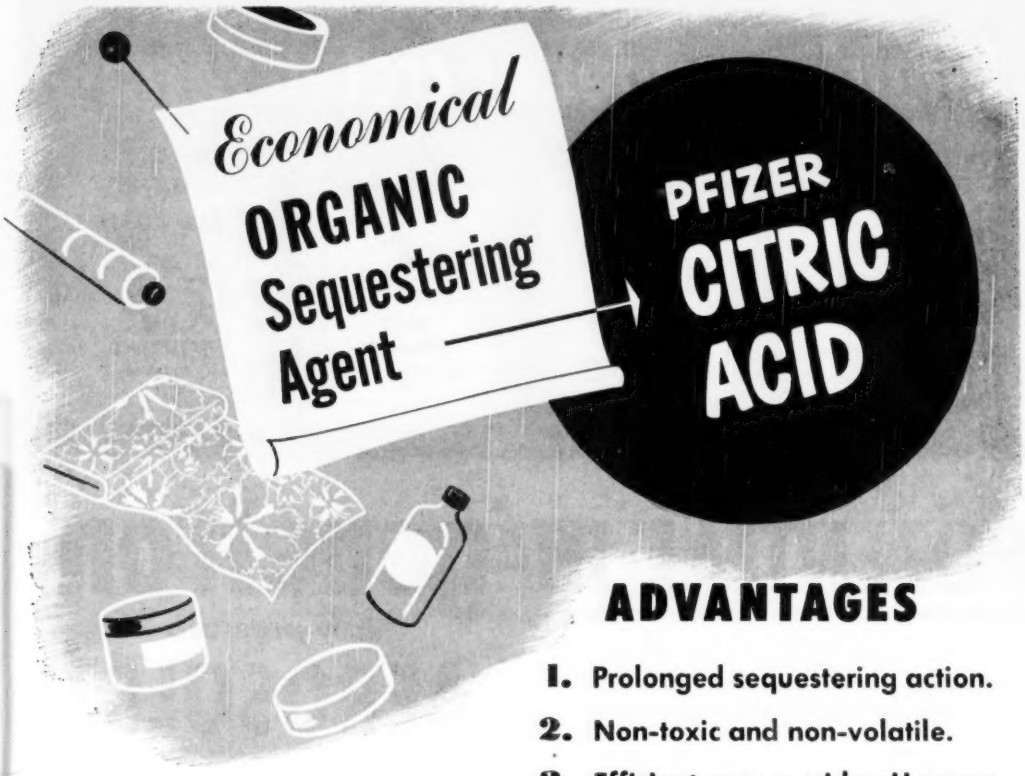
●"Genetron" is General Chemical's Registered Trade-Mark for its Halogenated Hydrocarbons.



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3. Efficient over a wide pH range.
4. Inexpensive.

• Pfizer Citric Acid is an economical organic sequestering agent widely applicable in the soap, textile, drug, cosmetic and other industries. It is economical to use because it is an inexpensive *organic* sequestering agent which provides long lasting sequestering action. This is especially desirable in the textile industry for dye baths.

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Pfizer Citric Acid is available in the U.S.P. grade and as Anhydrous Citric Acid. For further information on the sequestering action of Citric Acid please write: Chas. Pfizer & Co., Inc., 630 Flushing Avenue, Brooklyn 6, N.Y.; 425 North Michigan Avenue, Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.

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by R. A. FULTON and FLOYD F. SMITH*

DEVELOPMENT OF FORMULATIONS suitable for aerosol application in greenhouses has given better insect control, increased crop yields.

EVERYONE is familiar with household aerosols that have become standard products in chemical specialties lines in the last few years. Not so well known to the general public, but an important and growing outlet for insecticides, is the use of aerosols to control greenhouse pests.

The efficiency of formulations developed for such applications has been a boon to greenhouse growers in reduced labor costs, better pest control, greater production, and elimination of diseases caused by previously used pest control methods. Formulations and dosages are continually being revised and tested to improve upon this performance, and new chemicals are being made available for such use.

Experimental application of insecticides in greenhouses with liquefied-gas aerosols was started in 1941.[1] It was soon observed that the type of aerosol used in the household was not suitable for this purpose, because greenhouse pests are killed by different toxicants and because the solvents injure plant growth. Although many important greenhouse pests could be controlled with DDT, this insecticide gave unsatisfactory control of several species of aphids, spider mites and certain mealybugs. Experimental work with a number of other insecticides showed the so-called hexaethyl tetraphosphate to be effective in controlling these pests.

The liquefied gas Freon-12 (dichlorodifluoromethane) is used as the propellent for DDT aerosols. A formula containing 5 percent DDT, 5 percent cyclohexanone, 5 percent alkylated naphthalenes, 3 percent acetone, and 82 percent Freon-12 has been applied without injury to most greenhouse crops. Cucumbers, which are susceptible to injury from cyclohexanone, have been successfully treated with a DDT formula containing no cyclohexanone. Kalanchoes, however, are severely injured by all forms of DDT insecticides, including aerosols.

Innis, Speiden & Co.

GREENHOUSE USE of aerosols requires protective clothing and mask, like this.

TEPP AEROSOLS

Tetraethyl pyrophosphate is the principal active ingredient in hexaethyl tetraphosphate and commercial tetraethyl pyrophosphate. All preparations containing tetraethyl pyrophosphate are soluble in methyl chloride. In experiments in 1947, an aerosol containing 10 percent hexaethyl tetraphosphate (12 to 15 percent tetraethyl pyrophosphate) in methyl chloride was used, but in 1948 the hexaethyl tetraphosphate concentration was reduced to 5 percent. Both aerosols were applied at the rate of 1 pound for 50,000 cubic feet. In applying aerosols containing tetraethyl pyrophosphate it is very important to use the correct dosage for any given crop. Heating cylinders before application will give an overdosage, and this practice also presents a definite explosion hazard.

Hexaethyl tetraphosphate has been applied experimentally to over 200 species and varieties of plants, and has been used commercially on practically all crops growing in greenhouses, but direct injury has been detected in only two, chrysanthemum and tomato.[2] This injury, which resulted from using the 10-percent hexaethyl tetraphosphate formula, was more severe at low temperatures (60°-65° F.), but even at higher temperatures (80°-85° F.) slight injury was detected on a few varieties of chrysanthemums, particularly Nevada, and on several varieties of tomatoes, the most tender being Italian Salad. Excessive dosages of hexaethyl tetraphosphate applied to roses during the short days (October to January) caused another type of injury on the new growth that appeared several days after treatment. This injury consisted of malformed leaves and flowers similar to that produced by 2,4-D.

Further greenhouse tests showed that a 5-percent hexaethyl tetraphosphate aerosol gave the same killing effect with no plant injury on the tender commercial varieties of chrysanthemum and tomato. This 5-percent formula was substituted for the 10-percent formulation in 1948. Greenhouse men have used it with satisfactory results on tender vegetable crops as well as floral crops. Recently Fulton *et al.* have shown that plant injury is associated with particles of aerosol above 20 microns in diameter, and that kill of mites and insects is obtained by fine particles. However, the temperature range between 75° and 85° F. is commonly used to reduce chances of plant injury.

Increase in production has been noted in greenhouses where aerosols, especially those containing hexaethyl tetraphosphate, have been used. The retail trade in roses alone last year reported sales amounting to approximately $400 million. Surveys have shown an improvement in quality of blossoms together with an increase of 10 to 30 percent per year in production by individual growers.

* U. S. Department of Agriculture, Agricultural Research Administration, Bureau of Entomology and Plant Quarantine.

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Striking increases in production have been obtained during the summer months. It is during these months that spider mites become most numerous and damaging, and previous efforts to control them with water sprays or by syringing have increased blackspot infection and loss of foliage 2 or 3 weeks later. During the month of August production in one house was increased from 28,000 to 129,000 blossoms.

PARATHION AEROSOLS

Aerosols containing parathion, another phosphate-containing insecticide, are now supplementing those containing hexaethyl tetraphosphate. Parathion is especially effective against certain leaf tiers, mealybugs, and roaches that have been difficult to control. The formula now in common use is 10 percent parathion, 10 percent acetone, and 80 percent methyl chloride; and 1 pound of aerosol is applied to 50,000 cubic feet of greenhouse space. Production data with parathion aerosols are difficult to obtain because of the wide use of hexaethyl tetraphosphate in green houses prior to the introduction of parathion, and because of changes in cultural methods, including the use of ground corncobs as mulches on the beds.

The stability of parathion residues is not clearly understood. For the present, parathion aerosols should not be used on greenhouse vegetables—including tomatoes, cucumbers, radishes, lettuce, and mushrooms—after the edible part has been formed.

Reports have recently been made of unsatisfactory control of the two-spotted spider mite, *Tetranychus bimaculata* Harvey, following applications of parathion aerosols in some greenhouses. Laboratory tests have shown that there is a wide difference in susceptibility of spider mites from these houses when compared with that of mites having the same morphological characters from other greenhouses. This difference is not entirely due to the spider mites becoming resistant to parathion, since in one greenhouse range very high survivals were observed after the first application of parathion. These mites showed resistance also in varying degrees to the preparations containing tetraethyl pyrophosphate.

Tetraethyl dithiopyrophosphate, a derivative of tetraethyl pyrophosphate containing sulfur, is effective against the same greenhouse pests as hexaethyl tetraphosphate and is more toxic to resistant spider mites and to mealybugs. This compound is soluble in methyl chloride and is dispersed in a 5-percent aerosol in the same manner as hexaethyl tetraphosphate.

In experimental work it has been used on more than 150 kinds of ornamentals and on cucumbers, lettuce, and tomatoes with no plant injury when applied between 70° and 85° F. In commercial houses it has been used successfully on various crops, including roses, cucumbers, and tomatoes, except that the rose varieties Starlight and Golden Rapture were injured when the temperature was above 90°. Further studies are being made with this material in aerosols, but it will probably be used chiefly where the more resistant strains of mites are found and on tomatoes, where the margin between plant injury and insect control is very narrow when hexaethyl tetraphosphate is used.

NEWER INSECTICIDES

Octamethyl pyrophosphoramide is a systemic insecticide which is absorbed by the plant tissue either from the foliage or from the soil.[4, 5] This compound is soluble in methyl chloride and can be dispersed in a 5-percent aerosol in the same manner as hexaethyl tetraphosphate.

In experimental work,[6] 1 pound of this aerosol formulation in 50,000 cubic feet of space has killed resistant mites on young foliage of rose plants. The mites on the older foliage were killed more slowly, apparently because this tissue absorbed less of the chemical, and the few survivors renewed the infestation. Because this compound is absorbed by the plant and persists in the soil, more experimentation is required before recommendations can be made for its use. It has not yet become available commercially in this country.

p-Chlorophenyl *p*-chlorobenzene sulfonate (experimentally known as K-6451) when applied in an aerosol containing 5 percent of the technical product, 5 percent acetone, 1 percent cyclohexanone, and 89 percent methyl chloride, was more effective than when applied as a water spray. A dosage of 1 pound of aerosol solution to 50,000 cubic feet was required to kill nonresistant mites, but a 2-pound dosage appeared necessary for resistant mites. The material killed slowly; 3 days or more elapsed before any toxicity was noted. It differed from the organic phosphate insecticides in its mode of action toward mites in that adults and larvae slowly became paralyzed and many of them died with legs fully extended. However, toxicity appeared to continue for 10 days or longer, and

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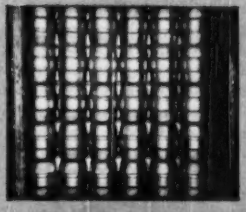

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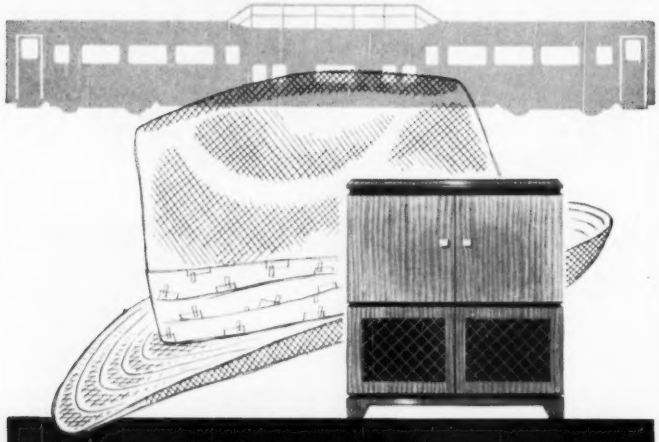

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most of the larvae died before they fully emerged from the eggs.

No injury to several varieties of commercial roses was evident after repeated applications of this aerosol from June to the last of September 1949. Certain growers, however, reported leaf drop in their greenhouses in October when the material had been applied at intervals of 7 to 10 days. Whether this defoliation is a seasonal response of roses, such as sometimes follows the application of parathion or other material, remains to be determined. This material is recommended only for experimental use.

USE AND SHIPPING PRECAUTIONS

The phosphate-containing insecticides are highly toxic to warm-blooded animals and are readily absorbed through the skin. When applying aerosols containing them, the operator should wear rubber-covered gloves, protective head covering, such as a cap with visor in the back, and a smock or overall that fits tightly around the neck. A full-face gas mask equipped with a canister designed for use in handling organic vapors, acid gases, and dusts must be used. After each application the operator should wash his hands and face thoroughly.

Shipment of aerosols by common carriers presented a definite problem. After a sufficient number of tests the standard 3B- and 4B-300 containers have been accepted with the following precautions: (1) the eduction tube has been eliminated, (2) the cylinders are packed in a heavy box equipped with a holding device to prevent damage to the valve.

The aerosol method of controlling insects and mites in greenhouses saves approximately 95 percent in labor over the older spraying method. One house formerly requiring 28 man-hours to spray is now treated with aerosol by one man in 15 minutes. Use of aerosols has not only given better pest control, but also reduced or eliminated serious diseases which were spread by water sprays or forceful sprinkling or syringing with water.

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The manufacturer about to launch—for example—a tile floor cleaner or a cutting oil, however, is more likely to feel that his product is "ready" when he is satisfied with its cleaning action on tile, or the way it works in the shop. He may think of adding an odorant if one of the raw materials in his formula is particularly obnoxious, but if it smells like tile cleaners or cutting oils always have smelled, he probably will not. He reasons that the jobs for which such materials are intended are rough, and that it isn't necessary for the product "to smell nice."

While this attitude toward the value of good odor in certain specialties may not result in failure for the manufacturer, it does limit the potential market of the product. Housewives don't like to use an insecticide that leaves a tell-tale odor after use, and they soon switch to a non-odorous or pleasant-smelling product if their latest purchase has the characteristic solvent odor. Use of more highly refined solvents has reduced this particular problem somewhat, but many of the newer insecticides need masking, and the producer who doesn't do it well will miss repeat sales.

Consumer preference for household specialties that are odorless or slightly perfumed is generally recognized. The present popularity of wick-type and aerosol household deodorants is good evidence of that. If a product is objectionable from the odor standpoint, the manufacturer will eventually hear about it.

INDUSTRIAL SPECIALTIES

In the field of industrial specialties the producer may find a different story. There may be repeated complaints from an operator on a bag making

OPERATORS like this dry cleaning "spotter" influence the sale of chemical specialties, boost those with good odor.

machine, for example, who says that a glue won't work. The operator may find fault with the consistency, tack, speed of drying—an endless number of reasons why the product is no good. The technical service department of the adhesives company may be unable to ferret out the trouble. Back of it all may be the inherent bad odor of the product that the manufacturer hasn't masked properly. The operator doesn't like it, and either consciously or unconsciously, is unable to use it successfully. Masking the objectionable odor, or adding an odorant that will give an odor the operator associates with a good product for the

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Typical Composition

Caprylic Acid	90.0%
Caproic Acid	3.0%
Capric Acid	7.0%

Neo-Fat 9 (Capric Acid)

Mean Molecular Weight	173.3
Titer	30.0°C.
Iodine Value (Wijs)	1.2
Neutralization Value	323.7
Color...White	Odor...Characteristic

Typical Composition

Capric Acid	90.0%
Lauric Acid	7.0%
Caprylic Acid	3.0%

Neo-Fat 11 (Lauric Acid)

Mean Molecular Weight	203.0
Titer	37.8°C.
Iodine Value (Wijs)	1.0
Neutralization Value	276.0
Color...White	Odor...Trace

Typical Composition

Lauric Acid	90.0%
Myristic Acid	9.0%
Unsaturated Acids	1.0%
Capric Acid	Trace

Neo-Fat 13 (Myristic Acid)

Mean Molecular Weight	226.0
Titer	37.8°C.
Iodine Value (Wijs)	2.0
Neutralization Value	248.0
Color...White	Odor...Characteristic

Typical Composition

Myristic Acid	90.0%
Lauric Acid	4.0%
Palmitic Acid	4.0%
Unsaturated Acids	2.0%

Neo-Fat 1-56 (Palmitic Acid)

Mean Molecular Weight	258.0
Titer	56.0°C.
Iodine Value (Wijs)	3.0
Neutralization Value	216.0
Color...White	Odor...Trace

Typical Composition

Palmitic Acid	90.0%
Oleic Acid	4.0%
Stearic Acid	6.0%

Neo-Fat 1-65 Stearic Acid

Mean Molecular Weight	282.5
Titer	67.0°C.
Iodine Value (Wijs)	3.0
Neutralization Value	198.0
Color...White	Odor...Trace

Typical Composition

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Palmitic Acid	6.0%
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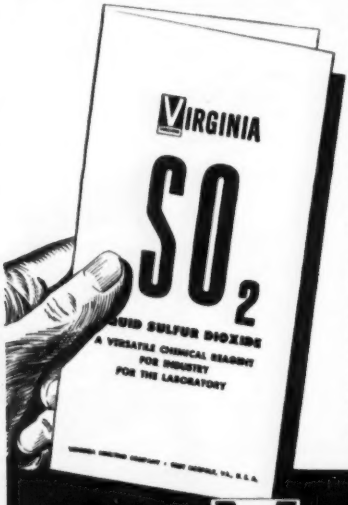

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In many cases a new product is held up until an odor problem can be solved. Plastics would generally be objectionable because of the odor of plasticizers or traces of unpolymerized monomer if it were not for suitable odorants that had to be developed. Sponge rubber for auto seats and furniture is another material in the same category.

Conversely, many times a new material replaces an old one, and the manufacturer seeks an odorant to give the odor associated with the old material. The substitution of plastics for leather in many applications raised a demand for something that "smells like leather." Masking the odor of paint components has been common practice with many manufacturers for a number of years, yet with the development of deodorized mineral spirits and synthetic drying oils, some producers have found it desirable to add odorants to give a faint aroma of linseed oil and turpentine.

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500 Fifth Ave., New York 18 • 2513 S. Damen Ave., Chicago 8

CHEMICAL SPECIALTIES——

Although the manufacturer who has an odor problem may find a solution by adding one of the cheaper essential oils or synthetics to his product, it isn't usually that simple. Odor masking is not just adding a strong agreeable odor to overcome an objectionable one. Most generally it involves using a number of materials that will blend with the undesirable odor to neutralize it or to form a different—and pleasant—odor. Odorant suppliers offer the common essential oils for general use, proprietary compounds for given problems, or test kits from which an odorant can be selected by experimentation, or tailor-make the odorant for a given job (E. C. Crocker, "Principles of Odor Masking," *CI, June 1949, p. 950*).

An industrial odorants supplier can probably shorten the trial-and-error period of selecting an odorant and can provide better masking or a more distinctive odor than the manufacturer can. Unless a special development problem is involved, this will be part of the company's regular service. Cost of odorants themselves is generally nominal since such minute amounts are used with large quantities of product. In many cases, the amount added will be only about 0.1%, and for a fly spray, for example, will cost probably from three to seven cents a gallon. With a new development, concealing the ingredients from the competition may itself be worth the price.

ALL TYPES OF PRODUCTS

Almost any kind of product will benefit from odor masking or odorizing, and the specialties on which successful jobs have been done is almost endless. Brake fluids, cleaning and degreasing compounds, bowl cleaners, floor waxes, detergents, solvents, and inks are a few. Basic chemicals and raw materials—acetic acid, hydrochloric acid, acetone, starches, oils, etc.—can also be made more agreeable to the user at little expenditure. This wins the approval of both the employees in the user's plant, and the manufacturer himself who doesn't introduce an unpleasant odor into his product.

With competition for sales becoming keener, it pays a manufacturer to make sure that the way his product smells isn't losing sales. It is poor business to spend a lot of time and money developing a good product only to have it warm shelves because of an objectionable odor. Good odor is associated with quality, and quality commands higher selling prices and repeat business.

no need to look further for **synthetic detergents**

SUPERIOR SYNTHETIC DETERGENT MATERIALS ARE AVAILABLE FROM ORONITE IN THESE THREE FORMS:

1. **DETERGENT ALKANE** For detergent or chemical manufacturers who have suitable sulfonating and processing equipment, Oronite Alkane is unique in type, quality and economy. A water-white, wholly synthetic alkyl aryl hydrocarbon, it is eminently suitable for making detergents and wetting agents of the highest quality.
2. **DETERGENT SLURRY** For detergent processors and manufacturers with blending and drying equipment. Detergent Slurry is an alkyl aryl sulfonate in paste form, easily blended for producing quality detergents.
3. **DRY DETERGENTS** Alkyl aryl sulfonates in dry form. New white color—available in 3 particle sizes, readily adaptable to compounding and repackaging operations.

Detergents from Oronite Alkane, in addition to providing unexcelled cleaning action are: superior emulsifiers of fats and greases; stable and effective in strong acid and alkali solutions; effective as reducers of surface and interfacial tension even in low concentrations. For complete detailed information, write the Oronite office nearest you.

OTHER ORONITE PRODUCTS:

Polybutenes • Cresylic Acids
Naphthenic Acids
Sodium Sulfonates
Purified Sulfonate
Phthalic Anhydride
Gas Odorants
Wetting Agents
Ortho, Para Xylene
Xylol
Lubricating Oil Additives
Aliphatic Acid
Hydroformer Catalyst

ORONITE CHEMICAL COMPANY

Reg. U. S. Pat. Off.

THE NAME TO WATCH IN CHEMICALS

ORONITE CHEMICAL COMPANY

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STANDARD OIL BLDG., LOS ANGELES 15, CALIF.
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
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924 WHITNEY BUILDING, NEW ORLEANS 12, LA.

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At Metalloy, all Lithium Compounds are now available in experimental quantities. Most Lithium Compounds may also be purchased, in quantity, commercially.

ALL OF METALLOY'S technical energies—Yes, 100% of our time—is concentrated on the research, development, application and production of Lithium for Industrial use. Constant collaboration with chemical and production engineers has earned for Metalloy acknowledged Lithium leadership in the Chemical Industry. LITHIUM is now generally realized a potentially unlimited resource for the Chemical Industry. Metalloy's Lithium Amide, to cite but one example, is an important contributory agent in the new and highly promising Antihistamines. There are many others of equal value.

Let Metalloy and Lithium go to work for you, today! Write Dept. A for details.

If It's Lithium—Call Metalloy!

Data sheets available from department A.

LITHIUM METAL
LITHIUM AMIDE LITHIUM HYDRIDE

METALLOY CORPORATION
SAND TOWER MINNEAPOLIS, MINN.
Division LITHIUM CORPORATION OF AMERICA, INC.

SPECIALTIES NEWS

New Esso Fungicide Nears Commercial Status

A new agricultural fungicide developed by Standard Oil Development Co., and field tested under the code name SR-406, is nearing commercial status, and testimony pertaining to its effectiveness is currently being presented before the FDA Residue Tolerance Hearing in Washington. The active component in SR-406 is N-trichloromethylthio-tetrahydrophthalimide, a colorless, crystalline compound melting at 172° C., insoluble in water but soluble in some organic solvents. The basic raw materials needed for commercial production are all available on a large scale.

The new material has been found to be a potent fungicide, effective against a wide array of plant diseases ranging from apple scab in the northeastern United States to tomato and potato blights in Florida, and diseases attacking banana and coffee in Central America. It is of special interest because of high potency on fruits. Preliminary toxicological tests indicate that the compound is non-toxic to warm-blooded animals. It is expected to come up before the current FDA hearings relative to Federal approval for its use in agriculture.

Manufacture and distribution of the fungicide will be handled by the California Spray-Chemical Corp.

Virginia Specialty Buys American Products Co.

The Virginia Specialty Corp., Lynchburg, Va., has purchased the trade marks, brand names, inventories, equipment, and good will of the American Products Co., Reidsville, N. C. It will continue the manufacture of the Nu-Shine line of shoe polish and various waxes at Lynchburg, Va.

Farmer Cooperation Urged As Bad Insect Year Seen

The prospect of infestations of three major insect pests exceeding the intensity of last year's outbreaks, has led the agricultural chemical industry through the National Agricultural Chemicals Association to urge farmers and growers to place at least a partial order for anticipated needs.

The boll weevil, European corn borer, and grasshopper are the three major insects expected in greater numbers by entomologists of the U. S. Department of Agriculture. The mild winter over much of the country for much of the season, and the heavy population of the insects last year point to a greater control problem this year.

Although the NACA reports that supplies are expected to be ample to meet requirements, it is urging this precautionary step by growers to insure adequate quantities of a given chemical when the insect season arrives.

B. W. Maxey (left), controller of the Glidden Co., elected a director of the company; and Alvin C. Ash, named technical sales representative for the Washington Agricultural Chemicals Division, Pennsylvania Salt Manufacturing Co. He was formerly with the Agricultural Technical Service Dept., Sherwin-Williams Co.

"What's New" Memo

Interested in new package for your product? Germicidal, deodorant soaps? Allethrin ("synthetic pyrethrum")?

Be sure you don't miss these articles in this issue:

"Better Bags", p. 500
"Germicidal Gold Rush", p. 504
"Kenya Kaput?", p. 506

Stein-Davies Building Plant Addition

Stein, Hall & Company, Inc. has awarded a contract to the Turner Construction Co. for the erection of an addition to the plant of its subsidiary, the Stein-Davies Co., in Long Island City for the manufacture of adhesives, textile and paper sizings and industrial food products.

The project involves a 5-story and basement building, 90 by 100 feet, with laboratory facilities on the fifth floor. Work will commence immediately and the project is scheduled for completion next October.

Pfizer Forms New Antibiotic Division

Chas. Pfizer & Co., Inc., has formed a new antibiotic division which will have as its initial activity the market-

DREW FATTY ACIDS
For Soaps And Detergents and other industrial uses

Distilled Coconut Fatty Acid—Minimum low fractions—ideal for liquid and paste soaps, synthetic detergents, shampoos, cosmetics, as well as rubber softening agents, fatliquors, etc.

AB Fractionated Double Distilled Coconut Fatty Acid—Stabilized to prevent discoloration—minimum of low fractions. Ideal for soaps, shampoos, shaving creams, plasticizers, stabilizers, alkyd resins.

ABH Hydrogenated Coconut Fatty Acid—Iodine value less than 2.0%—greater stability, longer shelf life. Ideal for soaps, synthetic detergents, shaving creams, cosmetics.

Formula 300 Distilled Stearic Acid—Exceptional color—mildest odor—highly stable. Ideal for hand lotions, deodorants, shaving creams, cold creams, cosmetics.

WELCOLINE OO Double Distilled Oleic Fatty Acid—Premium grade of Oleic Acid—low titre—high stability. Ideal for synthetic detergents, drycleaning soap, textile softeners, leather penetrants, plasticizers, emulsions.

Yes . . .
Soap and Synthetic Detergent Manufacturers . . .
have long recognized the superiority of
Drew Fine Fatty Acids!
To them, Drew Fine Fatty Acids
mean Faster Production—Lower Costs—Better Products!

To you in other industries . . .
Rubber, Paint, Textile, Leather, Plastic,
Food, Petroleum, Cosmetic, Paper . . .
Drew Fine Fatty Acids can help
improve your products—your processes!

Send for our reference booklet "Fatty Acids,"
with its wealth of information, specifications, applications
. . . let our chemists, research, products help you!

Distilled and Fractionated Fatty Acids
Soya • Linseed • Oleic • Cottonseed • Stearic
VRO • Coconut • Lauric • Capric • Caprylic
Glycerine (crude and refined) • Glycerine (textile grade)
Plasticizer S. C.

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CHICAGO PHILADELPHIA BOSTON GREENVILLE, S. C.

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JAYHAWK WORKS

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TANK CARS
and
DRUMS

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tell
you more

ing of Terramycin, the company's new antibiotic, under the Pfizer label. It will be marketed to the medical profession through service wholesale drug channels to retail pharmacies and hospitals.

Although present limited production has supplied 80 clinical investigators for evaluation of the drug, increased production will shortly make available limited supplies for distribution through wholesale channels.

SKF to Construct Plant In Montreal

A new pharmaceutical manufacturing and distributing branch will be opened in suburban Montreal this year by Smith, Kline & French Inter-American Corp. Ground-breaking for a new $160,000 plant to house the branch will begin shortly on an acre-and-a-half tract. Construction is expected to be completed by early fall.

This will be the first time that Smith, Kline & French Laboratories, parent company of the Inter-American Corp., has built or owned a branch outside the United States. Since 1926, the manufacture and distribution of SKF products in Canada has been handled by the Leeming Miles Co., Ltd., of Montreal. The new branch will take over these functions.

Other construction currently planned by SKF is an addition to its Philadelphia pharmaceutical plant and laboratories.

Start Rebuilding After Fire in Fertilizer Plant

Reconstruction of the building recently destroyed by fire at the Texarkana, Arkansas, fertilizer plant of International Minerals & Chemical Corp. is being undertaken immediately.

Cost of the total damage is still undetermined although the loss is covered by insurance. The fire consumed the main building, while the smaller nearby structures were saved including the warehouse and office, the ammonia storage tanks, and the superphosphate plant.

A.S.T.M. to Present Antifreeze Tests

The first group of standardized test methods for antifreeze will be presented by Committee D-15 on Engine Antifreezes at the annual meeting of the American Society for Testing Materials, to be held in Atlantic City the week of June 26. This first set of six methods is the result of an intensive cooperative study of test procedures over the past three years by this committee.

Among the tests to be outlined are that for freezing point (tentative depending upon completion of additional test work by the date of the meeting), including complete specifications for a hydrometer-thermometer; boiling point (tentative); specific gravity (tentative); determination of water in engine antifreezes by Karl Fisher method (tentative); ash test (tentative); reserve alkalinity (tentative); and test for pH value (tentative).

Two cooperative tests are also under way on corrosion and foaming, the static type beaker test being used and samples of antifreeze being distributed to cooperators. Each laboratory will use its standard test procedure regarding antifreeze concentration and conditions of operation. Correlation will be on basis of rating the effectiveness of the antifreeze used.

Contract Awards

Among recent government contract awards are the following: 80,000 gal. of rust-inhibiting enamel ($111,200) to Standard Paint & Varnish Co., New Orleans, and 120,000 gal. rust-inhibiting enamel ($165,000) to Atlas Paint & Varnish Co., Irvington, N. J., both let by Raritan Arsenal, Metuchen, N. J.; and dehydrating agent-grade A ($225,696) to Davison Chemical Co., Baltimore, and dehydrating agent-grade B ($244,926) to Filtrol Corp., Los Angeles, both let by the Air Force.

Houghton Fluid Approved For GM Transmissions

The automatic transmission fluid of E. F. Houghton & Co., Philadelphia, has been approved by General Motors Co. for use in its guaranteed transmission systems. Previously GM would only use a product marketed by itself, but under a new policy, it will use the fluid of an outside concern if it meets its exacting standards. Houghton is among the first to have its product so recognized.

Specifications for such fluids are: high resistance to oxidation at temperatures as high as 300° F.; viscosity to lubricate adequately, yet incur minimum of "drag" at temperature range of –40°-120° F.; foam resistance; low pour point; high oiliness value; extreme pressure characteristics; and no adverse effect on any transmission materials.

Booklet on Surface-Active Materials Gives Formulas

A new booklet, "Ethomeens, Ethomids, Ethofats," which has been issued by Armour and Co. to describe its emulsifiers, detergents, wetting agents and intermediates sold under

3 Benefits of standardizing on Hooker Sulfides

HIGH PURITY

Sodium sulfide (Fe 8 ppm Max.), Sodium Sulfhydrate (Fe 5 ppm Max.), and Sodium Tetrasulfide (other Sodium Salts, 1.0% Max.) exemplify the care Hooker uses in the preparation of these products. This quality enables you to turn out uniformly excellent products at no increase in cost. There is added saving due to the fact that the clean solution of sulfide and sulfhydrate can be used without settling or decanting—a worthwhile time saver—Purity Pays Dividends.

UNIFORM QUALITY

Dependably uniform quality cuts processing costs several ways. It is not necessary to keep a constant check on solution strength. Finished quality is uniform.

Variation in impurities can slow processing time and cause wide variations in quality and may even lead to possible rejection of the finished product. You get more than you pay for when you buy quality.

PROMPT SHIPMENT

Hooker's popularity as a source of sulfides is due in good measure to its painstaking efforts to meet the processing requirements of its customers. Prompt shipment from ample stocks keep customer's inventory requirements to a minimum.

Particular attention is paid to cleanliness of shipping containers to insure that no impurities mar the quality of the finished product.

Your first step to sulfide satisfaction is to write for samples and data sheets. Please make your request on your company letterhead.

SODIUM SULFIDE Na_2S

Mol. Wt. 78.1
M. P. . . . . 100°C

Light buff colored solid in flake form. Rapidly soluble in water; slightly soluble in alcohol; insoluble in ether. Also available in solid form.

ANALYSIS

Na_2S	60 to 62%
NaCl	1.5% Max.
Other Na Salts	2.0% Max.
Fe	8 ppm Max.
Cu, Ni, Cr, Mn, Pb	1 ppm Max.
Water of crystallization	35% Min.

USES

In manufacture of dyestuffs, chemical intermediates, paper pulp, soap and rubber, as an ingredient of dye liquor for textile dyeing; boiling out linen; ore flotation and metal refining, in unhairing hides and wool pulling; desulfurizing viscose rayon.

SHIPPING CONTAINERS

Steel drums . . . . . 90 and 350 lbs. net

SODIUM SULFHYDRATE NaSH
(sodium hydrosulfide)

Mol. Wt. 56.1
M. P. . . . . 55°C

Light lemon colored solid in flake form. Completely and rapidly soluble in water, alcohol and ether. Also available as a liquid.

ANALYSIS (Flakes)

NaSH	70 to 72%
Na_2S	2.5% Max.
NaCl	0.8% Max.
Na_2SO_3 and $NaHCO_3$	0.4% Max.
Fe	5 ppm Max.
Cu, Ni, Cr, Mn, Pb	1 ppm Max.
Water of crystallization	28 to 26%

USES

In preparation of dyestuffs and other organic chemicals such as thioamides, thiourea, thioglycolic acid, thio- and dithio-benzoic acids, sodium thiosulfate, in unhairing hides, in desulfurizing viscose rayon.

SHIPPING CONTAINERS

Flake: Lacquer-lined steel drums . . . . . 90, 350 lbs. net
Liquid . . . . . Tank Cars

SODIUM TETRASULFIDE Na_2S_4
(40% solution)

Mol. Wt. 174.23
Melting Range . . . 3.5 to 17°C

It is a clear dark red liquid with an odor of hydrogen sulfide.

ANALYSIS

Na_2S_4	40.44%
Sulfur	30.27%
Other sodium salts including sodium thiosulfate, sodium carbonate and sodium sulfate	1.0% Max.

USES

Reducing organic nitro bodies; insecticides and fungicides; ore flotation reagent, manufacture of sulfur dyes, preparation of metal sulfide finishes, soaking of hides and skins prior to unhairing.

SHIPPING CONTAINERS

Steel drums . . 90 and 350 lbs. net and Tank Cars

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

3 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.

New York, New York • Wilmington, California • Tacoma, Washington

HOOKER CHEMICALS

10-377

MONOCHLOROACETIC ACID • ORTHODICHLOROBENZENE • SODIUM BENZOATE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE

those trade names, is available without cost from the manufacturer. The characteristics, properties and reactions of these polyethylene glycol derivatives of fatty amines, fatty amides and fatty acids are described.

Of particular interest to specialties manufacturers are discussions of their known and indicated uses, and suggested formulas for many specific applications. Typical practical applications include formulas for insecticide emulsifiable concentrates, wax emulsions, mineral oil emulsions, waterless hand cleaners, insecticide sprays. Other subjects covered include emulsion paints, shampoos, detergent compounds, sanitizers, and de-inkers for paper.

Requests should be sent to Armour Chemical Division, Armour and Co., 1355 W. 31st St., Chicago 9, Ill.

Surveys Cover Creasing, Water Repellency

Because the properties of textiles are so important to the Army's Quartermaster Corps, its technical library in Philadelphia has produced a comprehensive literature and patent survey on creasing and crease-resistance, which is now generally available for the first time, through the Office of Technical Services, Washington 25, D. C. It may be obtained for $1.50 by order PB 99429 (mimeo).

Waterproofing and water repellency of textiles, another area of great importance in the development of military fabrics, has so detailed a literature that the Quartermaster compilation on this subject (dating back to 1937, and including patents) covers two volumes: PB 98016 (mimeo) $1.75 and PB 98016s (mimeo) $1.

IODIDES

★ Iodine Crude
★ Iodine U.S.P.
★ Potassium Iodide U.S.P
★ Feeding Mixtures

INQUIRIES INVITED

Chemical Division
McKESSON & ROBBINS INC.
155 EAST 44th ST. • NEW YORK 17, N. Y.
★ Offices in All Principal Cities ★

Company Notes

• **American Polymer Corp.** has expanded production of its high styrene-butadiene latices at its Illiopolis, Ill., plant. These are used mainly for paper coatings and emulsion paints.

• **Monsanto Chemical Co.** has designed and constructed a complete, experimental slasher for testing synthetic sizing agents. The stainless steel unit, part of an improved testing system developed by Monsanto, has been set up in the company's Merrimac Division textile laboratories at Everett, Mass.

The experimental slasher reproduces as closely as possible the model's counterpart in the mill. It is designed to afford great latitude in control of normal variables, and is expected to have a major role among preliminary screening aids, as well as in technical service to mills.

• **Edco Corp.,** Elkton, Md., manufacturer of greenhouse and industrial aerosols, has been awarded a contract to supply aerosol insecticide bombs to the U. S. Navy for the coming year. Bombs are DDT-pyrethrum type made to joint Army-Navy specifications.

• **Millmaster Chemical Corp.,** New York, N. Y., has been appointed exclusive agent for Wollastonite, a calcium metasilicate, and Diopside, a calcium magnesium metasilicate, by the Willsboro Mining Co., Inc., Willsboro, N. Y. These materials are the products of a beneficiating plant recently constructed in Willsboro to make commercially available unlimited quantities of various grades of multi-purpose industrial silicates at prices low enough to encourage a wide range of applications.

Millmaster reports that uses are being developed for Wollastonite in ceramics, glass, paint pigments, paper fillers, asphalt floor tiles, cement compositions, welding rod coatings, rubber fillers, insecticides, vegetable oil purifications, detergents, etc. The same applies for Diopside.

Apple production "up" 10 to 15%!

WALL STREET JOURNAL.
APPLE GROWERS say new bug-killing sprays have "practically eliminated" in-the-orchard losses due to insects. In Washington State, top U. S. producer of the fruit, apple men estimate the better bug battlers have lifted production 10% to 15% in recent years.

OTHER "PITTSBURGH" CHEMICALS

Alkyl Methyl Pyridinium Chloride
Alphanitronaphthalene
Benzol—Motor, Nitration, Pure
Creosote
Cresol—Meta Para, Ortho
Naphtha, Heavy Solvent
Naphthalene—74° and 78°
Para Amino Phenyl Mercuric Acetate
Phenol
Hydrochloric Acid—20° and 22°
Picoline—Alpha, Beta and Gamma
Pyridine—Medicinal and Industrial
Sodium Cyanide
Sodium Thiocyanate
Sulphate of Ammonia
Sulphuric Acid—60°, 66° and Oleum
Tar Acid Oil Disinfectants
Tar—Crude and Road
Toluol—Nitration and Commercial
Xylol—10°, 5° and 3°
2,4 Dichlorophenol

Pittsburgh Parathion helps do this job!

The bumper crop and fine quality of fruit from the great apple belts last year was due in part to the first really widespread use of Parathion. For this most potent insecticidal chemical yet developed not only destroys the European red mite and other arachnids but appears to be an effective control for a wider range of orchard insect pests than many previously used compounds.

Pittsburgh Agricultural Chemical Company, a division of Pittsburgh Coke & Chemical Company, is a basic producer of Parathion and offers *Pittsburgh* 15% and 25% Parathion Wettable Powders, chemically and biologically standardized.

Now is the time to assure your season's supply of this orchard-proved control chemical. For technical assistance and recommendations, write today.

PITTSBURGH AGRICULTURAL CHEMICAL COMPANY
Empire State Building • 350 Fifth Avenue • New York 1, New York

Affiliated with
PITTSBURGH COKE & CHEMICAL COMPANY
1952 Grant Building · Pittsburgh 19, Pa.

COAL CHEMICALS, ACTIVATED CARBON, NEVILLE COKE, EMERALD COAL, PIG IRON, GREEN BAG CEMENT, CONCRETE PIPE AND PRODUCTS

NEW CHEMICAL SPECIALTIES

Note: This section limited to new finished specialties. New raw materials and intermediates of interest to specialties manufacturers are described in New Products and Processes department.

Molybdenum Lubricant

Molybdenum-base lubricant has high stability, is more efficient than oil.

Molybdenum-based lubricant called Liqui-Moly, is now available for use in any conventional lubricating system from developer, Lubricants Division of The Lockrey Co., College Point 1, N. Y. It can be used alone, or added directly to crank-case or other oils which carry it to friction-surfaces. There it "plates out" on the metal, provides permanent low-friction anti-seizing coating.

The company reports tests showing that friction-surfaces running at high speed and under heavy pressure will heat up from 300-500% faster with ordinary lubrication oil than when running dry with only Liqui-Moly. Moreover, temperature rise with oil is continuous until failure and seizure, whereas with new material, it reaches a stabilization point and then usually recedes. Liqui-Moly's chemical stability over wide temperature range (effective from sub-zero to red heat) make it suitable for conventional automotive, bearing and gear applications; deep-drawing dies; eliminating "run in" time on precision bearings and slides; pipe-fitting compound; press fitting; tight-wound flat coil springs; guns, rifles, skis, etc., and permanent factory-lubrication of new products. Sample quantities for experimental purposes are available at $2.00 a pound from manufacturer.

Multi-Purpose Lacquer

New lacquer can be used on all types of wood and metal.

United Lacquer Mfg. Corp., Linden, N. J., has developed Base C 5015, a lacquer designed for use on all kinds of wood and metal products. It performs on wood, cold rolled steel, silver and other metals, and as a result may eliminate need for manufacturers to stock different lacquers for use on different materials.

The lacquer is reported to give good gloss, hardness, filling, film, and repellence to abuse, on metals and wood; and on aging it becomes alcohol-resistant. Base C 5015 can be applied by spraying or dipping, and is available in clear or colors; in full gloss, semi-gloss or flat finish. A thinner, base TO 939, has been formulated to reduce the lacquer. When used on wood, a sealer coat is used under two coats of lacquer; on metal, one coat of lacquer suffices.

Waterless Hand Cleaner

Cream base used in waterless hand cleaner containing lanolin.

Windsor Products Co., Des Moines, Iowa, has developed a waterless hand cleaner called Han-Du which has been tested in the Iowa area for some time, but is now being more widely distributed. It has the consistency of a hand cream on which it is based, and is perfumed.

Designed for painters, mechanics, printers and others whose work gets hands very dirty, it is also useful for office workers. It is sold in 16-oz. tins and 10-lb. pails at 59¢ a pound through hardware, automotive and paint supply houses. The manufaturer will also pack under private label.

Rust Preventive

In-process or stored metal protected by water-displacing rust preventive.

Sealbrite, a water-displacing type rust preventive, is being introduced to metal cleaning, fabricating and processing industries by London Chemical Co., 607 So. Dearborn St., Chicago. It provides durable protection to black-oxidized, phosphated or untreated metal surfaces during inter-operational and finished product storage.

Applied by cold dip or spray, Sealbrite covers 2700-3200 sq. ft. per gallon. After the article is dipped water is pushed out from the surfaces and is replaced by a dry protective film. This water drops to the tank bottom and can be drained off without affecting the solution. The dry, waxy film can be removed with petroleum naphthas when desired.

The new product has passed 30-day condensation tests under alternating conditions of high and low temperature and humidity, as well as the standard 30-day humidity cabinet and 30-hour salt spray tests.

Additions to Aerosol Line

Spot remover, aluminum paint and roach spray added to Bostwick aerosol line.

Spray-Kleen, Roach Spray and Power Spray Painter are three of the latest additions to the aerosol line of Bostwick Laboratories, Bridgeport, Conn. They are available in 6-ounce cans retailing at 98¢.

Spray-Kleen is a spot remover for use on clothes, upholstery, rugs, drapes, etc. It is being advertised as the home adaptation of the method of the professional "spotter" in the dry cleaning plant who uses a power spray gun. The solvent is non-flammable and is said to leave no ring after use.

The Roach Spray is said to contain a new Bostwick insecticide formulation designed especially for roaches, ants and silverfish.

The Painter gives a chrome aluminum enamel finish, is recommended for toys, bicycles, radiators, cabinets, etc.

Anti-Frosting Compound

Liquid prevents frosting of aircraft wings and tail.

Stratofrost is the new anti-frosting and wing de-icing compound just released by Fine Organics, Inc., New York, through its Aviation Chemicals Division. It is a clear, homogeneous liquid which may be diluted with fifty percent water before use.

The new material is intended to be sprayed or brushed on aircraft wings and tail surfaces either before expected frost, or as an icing preventive, or on iced wing surfaces to melt the accumulated frost. Residual film inhibits icing during take-off periods. It is also applied to surfaces before using wing covers to prevent their freezing to the wings and to make their removal easy.

Stratofrost meets fully the requirements of the U.S.A.F. Specification #3609. Its flash point is 85° F. It is available in 53-gallon and 5-gallon drums.

Wood Sealer

Monsanto offers water-impervious undercoat for lacquers and paints.

A new wood sealer is expected to find a market in brush handles, wooden bobbins for textile mills, doors and mill work. It is the product of Monsanto Chemical Co.'s Merrimac Division, Everett, Mass., and is designed as a penetrating, non-sanding, moisture-resistant undercoat for all types of lacquers, enamels and paints. Recommended for all kinds of wood, including plywood, it can withstand water immersion or weathering.

The sealer has an alkyd rather than a cellulose base. Proper thinners should be used in reducing the sealer.

Water Repellent Coating

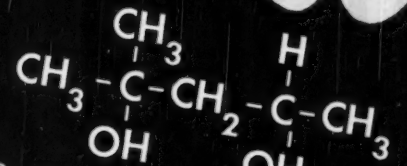
Transparent coating renders outside masonry walls waterproof.

Poly-Siloxane resin is the principal ingredient of the new No. V transparent coating developed by Ranetite Manufacturing Co., Inc., St. Louis. The water-repellent coating is used to make outside masonry walls, above grade, impervious to water, rains and dampness.

Ranetite, over a period of years, has developed over 35 water-repellent paints, chemicals, pastes and coatings. Packaging and retail prices of the new Ranetite No. V are $5.50 per gallon in one and five gallon cans, and $5.25 per gallon in

FROM SHELL CHEMICAL

HEXYLENE GLYCOL



(2-Methyl-2, 4-pentanediol)

A versatile, stable glycol with a variety of industrial applications

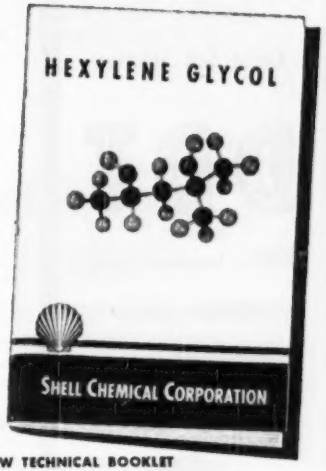
THE DIVERSIFIED USES of Hexylene Glycol are a result of *four* distinguishing features. Hexylene Glycol is (1) an ideal coupling or blending agent; (2) a high-boiling (198.3° C) solvent and penetrant; (3) an efficient wetting and dispersing agent; and (4) a mild humectant.

Hydraulic Brake Fluids. Brake fluids which contain Hexylene Glycol have high tolerance for moisture . . . show little tendency to promote rubber swelling . . . exhibit low corrosion characteristics . . . form clear solutions with other castor oil brake fluids.

Printing Inks. At ordinary temperatures press stability is insured by the low vapor pressure and mild hygroscopicity of Hexylene Glycol. At elevated temperatures of flash-dry ovens the relatively high volatility of Hexylene Glycol permits fast drying with higher, more uniform press speeds.

Cleaning Compounds. Hexylene Glycol, as a coupling agent in engine cleaners and general industrial cleaners, effects stable and homogeneous emulsions. In pre-spotting soaps, Hexylene Glycol couples the soap with water, contributes solvent power and facilitates the removal of last traces of soap and water during dry cleaning.

Other applications suggested by the coupling, wetting and high solvency properties of Hexylene Glycol include soluble cutting oils, grinding fluids, wood fungicides and textile assistants.



NEW TECHNICAL BOOKLET
Contains data on industrial applications . . . includes useful charts, tables, properties and specifications.

Booklet mailed on receipt of your letterhead request. Samples of Hexylene Glycol are available for your evaluation.

SHELL CHEMICAL CORPORATION

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Basic Chemicals for Agriculture

2,4-D

Acid

Sodium Salt

Butyl Ester

Isopropyl Ester

40% Butyl Ester Sol.

44% Isopropyl Ester Sol.

Amine Salt Solution

DDT

100% technical grade

wettable powder

dust concentrates

emulsifiable solutions

KOLKER

Chemical Works, Inc.

Manufacturers of Organic Chemicals

80 LISTER AVE., NEWARK 5, N. J.

55 gallon steel drums. Distribution started recently.

Fungus Free Shoes

Shoe lining materials can be treated to avoid reinfection from athlete's foot.

The Dow Chemical Co. now provides a chemical which, when used to treat shoe linings, prevents the shoe from becoming a source of reinfection to the individual who has finally gotten rid of athlete's foot. The chemical is a solution of 3-phenylsalicylate, and it reduces the spore count of athlete's foot fungi below the reinfection point. Shoe linings, canvas and cloth shoes can be sprayed or dipped by the manufacturer.

Tests carried out on humans show it to be neither irritating nor sensitizing. The chemical is also permanent and imparts no odor to the liner or shoe. In addition to its sanitizing effect, it prevents mildew. It will be marketed through shoe manufacturers.

Paint Stripper

Speed and ease of use feature new stripper.

Loncoterge #2063 has been developed by the London Chemical Co., Chicago, for use as a rapid stripper of high baked acid and alkali-resistant finishes that will also rapidly remove carbonized films and hard caked buffing compounds. It strips difficult finishes, including baked japanning, in two to five minutes, where normal time for standard alkali type strippers is four to eight hours. This speed is accomplished without using solvents and without toxicity, odors, and explosive hazards.

Loncoterge #2063 can be used either as received or as a water dilution, depending on the type of finish to be removed. It is used in the temperature ranges of 155 to 225 degrees—the range at which this material reaches its maximum activity. It can be used as part of the conveyorized painting cycle, so that rejected parts can be rapidly stripped and re-cycled to the paint spraying booths and ovens.

Vat Thickener

Vat thickener permits printing of French crepes without blurring, mottling.

A specially developed vat thickener that is producing excellent results for textile printers on French crepes and Bemberg sheers, is being manufactured by National Starch Products, Inc., 268 Madison Avenue, New York 16, N. Y. Known commercially as Ambertex M, this vat thickener has two features of immediate interest. It penetrates the cloth, insures a complete discharge of the ground color and prints with unmottled, sunbright brilliance. It also has a cohesive action that not only holds the pattern to the exact proportions of the original engraving but also reproduces the pattern with razor-sharp detail.

Field reports say that Ambertex M, by depositing a soft, pliable film on the cloth, eliminates "splitting" on French crepes and Bemberg sheers. This overcomes the well-known tendency of ordinary thickeners to embrittle, crack or rupture these fabrics.

It is said to be less expensive to prepare than conventional cook-up thickeners. With it, vat pastes can be readied in 30 minutes instead of the usual three to four hours.

Virus Spray

Spray combats virus infection in poultry flocks.

A virus spray has been developed by the Raymond C. Crippen Research and Development Laboratories in cooperation with the Atlantic Supply Co., Baltimore. It is an effective aid in preventing spread of virus infections among poultry flocks. Tests have shown it to control coryza, newcastle disease, and similar viruses.

• **Lotion** designed to prevent and heal impetigo, diaper rash and heat rash in babies has been developed by Johnson & Johnson, New Brunswick, N. J. It contains the germicide hexachlorophene (*see* "Germicidal Gold Rush," this issue, p. 504).

• **New Band-Aid type dressings** now come in three different shapes and sizes, round spot dressings, square patch dressings, and rectangular elastic adhesive bandages. Johnson & Johnson is producing them for the Davis Emergency Equipment Co., Inc., Newark. Individually wrapped, each dressing has a vent hole for aeration, and is elastic, water-proof, sterile, and flesh colored. The various shapes are designed to provide appropriate dressings for all first aid needs.

• **Rubberized fabric,** capable of giving useful service in temperatures of more than 85 degrees below zero, has been developed and is now being manufactured by The B. F. Goodrich Co. A synthetic rubber is used to impregnate the fabric which is now being used in a new type of exposure suit for members of the Armed Forces. Goodrich supplies the rubberized fabric and another company fabricates the clothing.

• **Black pepper and cardamon replacements** are the two newest seasoning oil imitations being made by Fritzsche Brothers, Inc., New York. Closely reproducing characteristics of genuine oils, these substitutes have the advantages of economy and uniformity.

DRYMET*

THE ECONOMICAL DETERGENT SILICATE

Cowles DRYMET, anhydrous sodium metasilicate, is the most highly concentrated form of sodium metasilicate available. It is more economical to use, on the basis of both Na_2O (alkalinity) and SiO_2 (silicate) than any other type of hydrated or anhydrous detergent silicate, either compounded or by itself. DRYMET contains no water of crystallization.

DRYSEQ*

THE ALL-PURPOSE DETERGENT SILICATE

Cowles DRYSEQ, anhydrous sodium sesquisilicate, is a medium pH alkaline cleaner which will do fast, dependable work at a low cost to the user. It is a white, free-flowing powder, quickly and completely soluble in hot or cold water—containing 56.75% Na_2O—making it an economical base material for compounding.

Cowles CHEMICALS

DRYORTH*

THE HEAVY-DUTY DETERGENT SILICATE

Cowles DRYORTH, anhydrous sodium orthosilicate, is a powerful, speedy, heavy-duty cleaner with valuable penetrating and wetting-out properties, reinforced dirt-removing power and unusual emulsifying action. It is an anhydrous, free-flowing powdered silicate containing not less than 60% Na_2O, which may also be used as an economical constituent of high pH cleaning compounds.

CRYSTAMET*

THE MEDIUM pH DETERGENT SILICATE

Cowles CRYSTAMET is a pure, perfectly white, free-flowing granular pentahydrate sodium metasilicate with the normal 42% water of crystallization. Suggested for compounding when it is desirable to lower the concentration of a finished product. Readily soluble—chemically stable—easy to handle. Can be used on medium pH jobs.

★ PROMPT SHIPMENTS FROM CONVENIENT WAREHOUSE STOCKS . . .

We'll be glad to send you our DRYMET File Folder containing complete technical information and suggested formulations.

*REG. U. S. PAT. OFF.

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HEAVY CHEMICALS DEPARTMENT • CLEVELAND 3, OHIO

industrial aromatics

deodorants

germicides

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preservatives

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* for paints, textiles, adhesives, paper, plastics, solvents, rubber and other chemical industries

SINDAR Corporation

Industrial Aromatics and Chemicals

330 West 42nd Street, New York 18, N. Y.

TRADE MARKS OF THE MONTH

From Official Gazette—Vol. 629, No. 4 (Dec. 27) and Vol. 630, Nos. 1-3 (Jan. 3-17).

RATMUS. Animal chemical attractant for trapping and exterminating rats and wild life. 507,661. Sparhawk Co.

TOP-CROP. Liquid fertilizer. 519,371. Southwest Chemical Co., Inc.

NU-FLOOR. Floor finishes—namely, ready-mixed paints and resinous varnishes. 519,509. Arto Mfg. Co., Inc.

Prepwash. Chemical preparation for cleaning and preparing metal surfaces to receive paint. 519,511. Neilson Chemical Co.

THE ONLY BELL THAT WILL NOT "RING". Cleaning fluid (dry cleaner). 519,530. Bell Chemical Co.

PLASTOJEL. Modified potato starch used industrially, as in the manufacture of ceramics. 519,791. Howard D. Meinecke.

PREP-N-COTE. Chemical preparation for removing dust cleaning and forming of phosphate corrosion resisting surface to receive paint. 519,793. Neilson Chemical Co.

SOILFUME 60-40. Insecticide. 519,812. Food Machinery & Chemical Corp.

THE GOLDEN BAR WITH THE CLEAN NAPTHA ODOR. Soap. 519,819. Fels & Co.

Plyit. Varnish. 528,764. Armolite & Co.

EDIXO METAL-KOTE. Exterior metal preservative paint. 533,366. Phelan-Faust Paint Mfg. Co.

GILWHITE. Exterior and interior paints and varnishes. 535,400. Gilman Paint and Varnish Co.

GIL-LAC. Exterior and interior paints and varnishes. 535,410. Gilman Paint & Varnish Co.

GIL-LITE. Exterior and interior paints and varnishes. 535,411. Gilman Paint & Varnish Co.

Faircrest. Pharmaceuticals, cosmetics toiletries. 536,368. The Fair.

Flic. Lighter fluid. 537,401. Arrow Products Corp.

DURAFILL. Paste wood filler. 537,507. Reliance Varnish Co., Inc.

HARF DELITE. Shampoo for hair. 539,157. Harf Inc.

STOPALL. Waterproofing material for masonry, which is completely invisible after application. 539,458. Stopall Waterproofing Mfrs, Inc.

DEB-O-LITE. Paints, varnishes, baking enamels, colors in oil, paint undercoaters, paint sealers, lacquers, wood stains, liquid paint removers and dryers. 540,047. De Boom Paint Co.

Bob-O-Link. Paint enamel. 542,425. Maryland Colloid Co., Inc.

Cyclone. Liquid paint and varnish remover. 547,605. Royal Chemical Labs.

LOGO. Solutions of organic polymeric substances for surface treatment for plastics to impart increased hardness, luster, reduced attraction for dust. 548,312. Bee Chemical Co.

D.M.C. Cable paint. 548,541. Edward Smith & Co., Inc.

MASTER-MIXED. Paint and varnish cleaner, floor cleaner, all purpose cleaner, glass cleaner. 549,011. Sears, Roebuck & Co.

KRANO. Primer compound for concrete, paint for coloring surfaces of concrete, surface sealer compound for concrete, varnish type finish for wooden floors, and penetrating sealer for wooden floors. 551,715. Krano Products Co.

OLDOWAY. Room deodorants in powder, paste, and cream form. 554,143. O-Cedar of Canada Ltd.

BLACK MAGIC. Oil base drilling fluid. 555,836. Oil Base, Inc.

ARKOLENE. Sulfonic acid compounds useful as wetting agents and penetrants in the wet processing of textiles. 555,980. Arkansas Co., Inc.

whiz-fizz. Room deodorant. 556,183. Hardin Chemical Co., Inc.

PARACIDE. Insecticides. 556,194. Hooker Electrochemical Co.

PARADI. Paradichlorbenzene. 556,195. Hooker Electrochemical Co.

NONISOL. Nonionic, fatty ester type emulsifying and solubilizing agents. 556,235. Alrose Chemical Co.

UIR. Shampoos, emulsifying agents, dyestuffs. 557,786. United International Research, Inc.

ALUMNITE. Automobile radiator compound to seal minor leaks. 558,114. Alumnite Products Co.

SUNNY SOUTH. Pine oil, pine tar oils, pine tar, oils used in disinfectants, wood acids, and pine creosote. 558,136. Glidden Co.

MY-CY. Deodorant and mildewproofer, 559,557. Chemspecs Lab.

Lime Crest. Ground or pulverized limestone for neutralizing acid wastes and hydrated lime for the treatment of sewage. 559,622. Limestone Products Corp. of America

(Symbol) Ground or pulverized limestone for use in neutralizing acid wastes and hydrated lime for the treatment of sewage. 559,623. Limestone Products Corp. of America

BESTZ. Liquid waterproofing preparation for application to wood, masonry, cloth, and other similar surfaces. 559,644. Bestz Proofing Products.

HW SOAKER ALKALI. Inorganic detergent having water softening properties for general washing purposes, especially for bottle washing. 561,897. Diamond Alkali Co.

AVCOSPIN. Conditioning media for lubricating, sizing, and dressing yarns, threads, and filaments. 562,019. American Viscose Corp.

XEROPOWDER. Powder for making powder images from electrostatic images on electrophotographic plates. 563,180. Haloid Co.

PIN LIFE. Lacquor for bowling pins and lacquer thinner. 563,392. Brunswick-Balke-Collender Co.

CITROSYNTH. Odor preparation used in manufacture of perfumes, disinfectants, insecticides. 564,103. Florasynth Labs Inc.

MARATAN. Tannery materials and extracts which contain lignin-sulphonic acid compounds. 564,136. Marathon Corp.

HAMIKLEER. Oleaginous fatty liquid which makes a clear solution when added to water, used in admixture with water for wet grinding and cutting metal with the power of protecting said metal from rusting. 564,510. Haas-Miller Corp.

GENITHION. Parasiticides. 564,593. Allied Chemical & Dye Corp.

ORONITE. Chemical products and chemical intermediates. 564,732. Oronite Chemical Co.

ORONITE CHEMICALS. Chemical products and chemical intermediates. 564,733. Oronite Chemical Co.

RILEY BROS. THAT'S OIL. Lubricating oils, lubricating greases, gasoline, and kerosene. 564,739. Riley Bros. Inc.

PLAY SAFE. Dry powdered water purifier and settler, in ready mixed form, to be placed in cisterns and wells. 565,790. Play Safe Water Chemical Co.

COPRTOX. Antifouling bottom paint. 565,931. International Paint Co., Inc.

10 TO ONE TUNE UP. Lubricating oil for conditioning internal combustion engines. 565,975. Ten-To-One Chemical Co.

M & T. Tin compounds used for tin-plating, ceramics manufacture, lens polishing, rubber manufacture, and as resin stabilizers; antimony compounds used for ceramics manufacture and flame-proofing; and zirconium compounds used for enamel opacifier and ceramics manufacture. 566,164. Metal & Thermit Corp.

W. Varnishes, chemical varnish remover, paint thinners or diluents, wood sealers, and paint primers. 566,201. C. A. Woolsey Paint & Color Co., Inc.

DIWEEVIL. Grain and seed fumigant. 566,256. Woolfolk Chemical Works, Ltd.

LUCOFLEX. Plastic material. 566,667. Societe Anonyme Des Manufacturers des Glaces et Produits, Chimique de Saint-Gobain, Chauny & Cirey.

LITHOCHROME. Chemical compositions for coloring cement. 566,810. L. M. Scofield Co.

DEZOL "OILOY" MOTOR OIL A UNIVERSAL PRODUCT. Lubricating oils and greases. 566,816. Universal Motor Oils Co., Inc.

CYCOR. Urea formaldehyde and ketone formaldehyde resins for sand core binders. 567,124. American Cyanamid Co.

D.I.O.P. Di-iso-octyl phthalate. 567,205. Ohio-Apex, Inc.

SETSWELL. Compounds for conditioning printing inks to prevent offsetting and stop muffling. 567,243. J.E. Doyle Co.

ESTERON. Weed-killing composition. 567,686. Dow Chemical Co.

WHITE ROCK. Automotive anti-freeze. 567,822. White Rock Supply Co.

EMOCITHINE. Emulsifying agents. 568,206. Naamlooze Venootschap W. A. Scholten's Chemische Fabrieken.

SKIP-STAIN. Liquid preparation for removing stains from fabrics and textile materials caused by animals. 568,276. Polk Miller Products Corp.

Gilron. Industrial lubricating and cooling composition for forming on metal stock a dry homogeneous self-adherent lubricating and cooling film adapted to lubricate the metal during subsequent die forming and other shaping operations. 568,609. Gilron Products Co.

DRAWCOTE. Industrial lubricating and cooling composition. 568,610. Gilron Products Co.

ATLANTIC. Petroleum waxes, lubricating greases, lubricating oils, and motor fuels. 568,708. Atlantic Refining Co.

FREZALL. Solid carbon dioxide. 569,020. Spencer Chemical Co.

ISCOMIST. Insecticides, larvicides, fungicides, and deodorants. 569,158. Innis, Speiden & Co.

"Paq". Interior and exterior paints, paint enamels, and paint oils. 569,263. Foy Paint Co., Inc.

ARATHANE. Agricultural acaracides, insecticides, and fungicides. 569,301. Rohm & Haas Co.

Subath. Sudsing cleaner, cleanser and detergent. 569,453. Hewitt Soap Co., Inc.

PARADOX. Anti-freeze solution. 569,470. Paradox Anti-Freeze, Inc.

Multi-storage availability with ESSO SOLVENTS!

With water terminal and storage facilities in industrial centers, ESSO SOLVENTS are always conveniently *available*. Prompt shipment and quick delivery to your door is assured in any quantity . . . tank cars, tank trucks, or drums. Specify Esso Solvents for dependable delivery *when* you need them, *where* you need them.

YOU CAN DEPEND ON ESSO SOLVENTS FOR

- **MULTI-STORAGE AVAILABILITY** — water terminals in industrial centers.
- **MODERN HANDLING METHODS**—separate tank storage, pumping lines, tank cars and trucks, are used in all Esso Solvent handling operations. Prompt, efficient delivery to your door is assured.
- **UNIFORMITY** — made in modern refineries from carefully selected crude oil sources.
- **ECONOMY** — closely-controlled quality gives constant, efficient industrial processing, high-quality products.
- **CONTROLLED EVAPORATION** — available in a wide range of evaporation rates with precise characteristics to meet your requirements.
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Controlled high quality helps produce larger profits with versatile, dependable Esso Solvents.

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ESSO STANDARD OIL COMPANY—Boston, Mass.—New York, N. Y.—Elizabeth, N. J.—Philadelphia, Pa.—Baltimore, Md.—Richmond, Va.—Charleston, West Va.—Charlotte, N. C.—Columbia, S. C.—Memphis, Tenn.—Little Rock, Ark.—New Orleans, La.

FOR TECHNICAL ASSISTANCE

If you have a solvents problem or want further information on the specifications and characteristics of Esso Solvents—write or call our office nearest you. Our technicians will be glad to assist you.

NEW PRODUCTS & PROCESSES

Refrigerant

Azeotropic mixture of Freon-12 and Genetron 100 is 18% more efficient.

A new refrigerant, known as Carrene-7, developed by Carrier Corp., Syracuse, N. Y., is expected to find widespread use in the air conditioning and refrigeration industry.

Carrene-7 permits a reciprocating compressor charged with the new gas to produce a substantially greater refrigerating effect. The immediate result of this characteristic will be to increase the effective capacity of available reciprocating compressors about 18% without redesign.

Carrene-7 was developed after six years of investigation carried out under the direction of Dr. William A. Pennington, chief chemist and metallurgist of Carrier Corporation, who was assisted in the work by Winston H. Reed, holder of a Carrier fellowship at Syracuse University.

The new refrigerant is an azeotropic mixture of dichlorodifluoromethane (Freon-12) and unsymmetrical difluoroethane (Genetron-100).

Carrene-7 satisfies all of the important requirements for a useful refrigerant. It is chemically stable, noninflammable, physiologically safe, and does not attack or corrode the common materials of construction. Its cycle efficiency and other thermodynamic properties are very similar to Freon-12.

Limited applications have already been made, and plans are being formulated for broad commercial use.

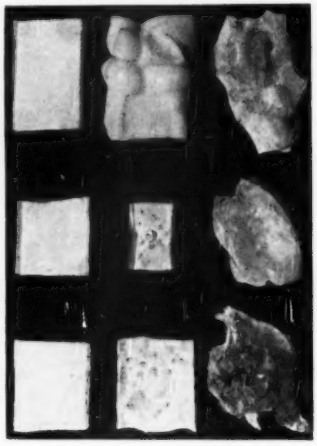
Plastic Fire Test

Method developed at Bureau of Standards accurately evaluates ignition characteristics of plastics.

The increased use of plastics has accentuated the need for more accurate data regarding the ignition temperature of various commercial plastics. Procedures or methods used have not always yielded minimum ignition values—information required for the formulation of adequate safety regulations. An investigation of this problem at the National Bureau of Standards, Washington 25, D. C., has resulted in the development of a new method and apparatus for the determination of the "self-ignition" temperature of plastics.

Ignition temperatures obtained with this procedure are consistently reproducible within a few degrees and are generally lower than values previously reported.

Two basic physical quantities are significant in the Bureau's method. The first is the "flash-temperature": the lowest temperature at which the amount of combustible gas emitted from a heated sample will be ignited by the external flame. The second is the



Experiments at the National Bureau of Standards determine the ignition temperature of plastics.

"self-ignition temperature": the lowest temperature at which oxidation within the plastic mass or its gaseous envelope will liberate enough heat to cause self-ignition. The result is an explosion, a flame, or a sustained glow.

The self-heating of plastics and other organic materials to temperatures far above the temperature of their surroundings is a phenomenon that is often neglected. Solids heated to a temperature above the initial oxidation temperature will self-heat through a reaction with the oxygen in the air.

Plasticizer

Polyaromatic hydrocarbon plasticizer for vinyls and GR-A rubber is light-colored, economical, confers good electrical properties.

Panaflex BN is a high-boiling synthetic hydrocarbon oil for use as a coplasticizer for vinyl resins and a primary plasticizer for GR-A rubber. It is a relatively low-priced, extremely light-colored product suitable for use in many applications where color and electrical properties are of primary importance.

Panaflex BN is an alkylated polyaromatic fraction synthesized by Pan American Chemicals, 122 E. 42nd St., New York 17, N. Y., from raw materials obtained from the adjacent major Gulf Coast refinery of the Pan American Refining Corp.

Panaflex BN is soluble in both aliphatic and aromatic hydrocarbons. It is compatible with most ester-plasticizers, vegetable and mineral oils, and many other common oils, waxes, rubbers, resins and polymers.

Propionitriles

Four beta-substituted propionitriles are experimentally available from Cyanamid.

American Cyanamid Co. now has four beta-substituted propionitriles on its list of experimental chemicals. They are β-dimethylaminopropionitrile, β-isopropylaminopropionitrile, β-methoxypropionitrile, and β-isopropoxypropionitrile. The alkylamino compounds are miscible with water, while the alkoxy compounds are soluble to a lesser degree. All four nitriles are soluble in the common organic solvents.

The chemical reactivity of these nitriles has led to their potential application as intermediates for the synthesis of new plasticizers, dyes, resins, and insecticides. In order to make the data on the physical and chemical properties of this group of compounds more readily available, New Product Bulletin No. 12 has been prepared. Copies may be obtained by addressing the New Product Development Department, American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.

Neoprene Improves Paper

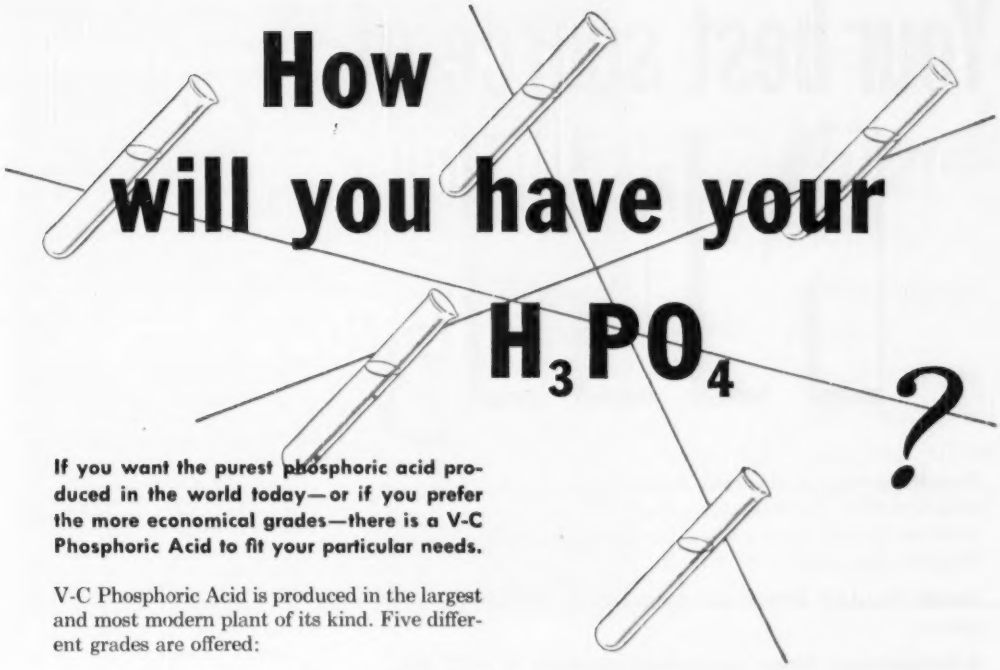
Small proportions of new neoprene latex improve paper's wet strength and other properties.

A new type of Du Pont neoprene, especially developed for treating paper, and a mill-tested process for adding it to pulp to increase the strength and chemical resistance of the finished paper have been developed by the Du Pont Co.

The neoprene is added to paper at the beater, and in most of the plant work a new type of neoprene latex was employed. The new product, known as Neoprene Latex Type 735, is a modification of standard types and is well adapted to the technique used in adding it to the pulp.

Very small percentages of the new neoprene produced papers having outstanding wet strength. It has not been previously possible to produce high wet strength by beater addition of small percentages of elastomers. In addition

How will you have your H_3PO_4 ?



If you want the purest phosphoric acid produced in the world today—or if you prefer the more economical grades—there is a V-C Phosphoric Acid to fit your particular needs.

V-C Phosphoric Acid is produced in the largest and most modern plant of its kind. Five different grades are offered:

1 **V-C 85% N.F. Grade** surpasses National Formulary and American Chemical Society specifications and meets all U.S. Food and Drug Administration regulations. This odorless, water-white, sparkling-clear, syrupy liquid is made from elemental phosphorus and has exceptional utility where unsurpassed purity is indicated.

2 **V-C 85% Technical Grade** is a clear, odorless liquid of syrupy consistency, slightly higher in impurities than the N.F. Grade, but with similar physical characteristics.

3 **V-C 75% Food Grade** far surpasses all Food and Drug requirements for this grade. It is sparkling, water-white and odorless.

4 **V-C 50% Food Grade** meets the same high standards as the 75% Grade except that it is more dilute.

5 **V-C 62½% Commercial Grade** is a greenish-brown, "wet-process" acid containing 62½% free phosphoric acid with a relatively high P_2O_5 content due to dissolved phosphates (averages 49%).

Depend on V-C to supply your H_3PO_4 needs—not only because there is a complete line of V-C Phosphoric Acids—but also because you can rely on V-C for speedy deliveries and friendly, helpful service. V-C Phosphoric Acid is shipped in rubber-lined tank cars . . . and in stainless steel drums, barrels and carboys. Forty-eight hour truck delivery in Middle Atlantic and Southeastern states. The services of V-C technical experts are available to you without charge. We invite your inquiries.

VIRGINIA-CAROLINA CHEMICAL CORPORATION

Chemicals Division: *401 East Main St., Richmond 8, Virginia*

PHOSPHORUS

PHOSPHORIC ACIDS

85% N.F. Grade • 85% Technical Grade
75% Food Grade • 50% Food Grade • 62½% Commercial Grade

SODIUM PHOSPHATES

Disodium Phosphate (*Technical and Drug Grades*)
Trisodium Phosphate • Tetrasodium Pyrophosphate
Sodium Tripolyphosphate

CALCIUM PHOSPHATES

Monocalcium Phosphate • Lucky Leaven® Phosphate
Phosphate Paste

VC CHEMICALS ®

Your best source of NH_3

Barrett Standard Anhydrous Ammonia is America's leading source of NH_3. Its dependable quality, consistent purity and uniform dryness have made it the standard for the chemical industry since 1890.

Barrett Standard Anhydrous Ammonia is available in two grades:

▶ **Refrigeration Grade, guaranteed minimum 99.95% NH_3.**

▶ **Commercial Grade, guaranteed minimum 99.5% NH_3.**

Both grades are shipped in tank cars with a capacity of approximately 26 tons of NH_3. Refrigeration Grade only is also packaged in 150, 100 and 50-pound cylinders. Tank car shipments are made from Hopewell, Virginia, and South Point, Ohio. Loaded cylinders are stocked at points conveniently located from coast to coast.

Barrett Standard Anhydrous Ammonia passes rigid tests for moisture, non-condensable gases and other impurities, before release for shipment. Cylinders and tank cars are thoroughly cleaned and inspected, upon return to the plant, before reloading.

The advice and help of Barrett technical service men are available to Barrett customers without charge. For information, contact Barrett, *America's leading distributor of ammonia.*

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N.Y.

*Reg. U. S. Pat. Off.

to high wet strength, the papers treated with small percentages of the new latex possessed unusually high breaking elongation, high tensile strength and excellent resistance to folding and to tearing.

In addition, neoprene-treated papers display considerable resistance to a variety of chemicals: Neoprene-treated papers after immersion for 24 hours in 5% solutions of hydrochloric, sulfuric, nitric, phosphoric, and stearic acids, retained a considerable proportion of their original strength. Results of these tests indicate possible use of neoprene treated paper for many packaging applications, particularly those involving industrial chemicals and possibly citrus fruits. Neoprene treatment might make it possible to use lighter-weight papers for producing tough, wear- and scuff-resistant packages of many kinds.

Alkylated Arylamine

Goodrich Chemical offers experimental amounts of p,p'-dioctyl diphenylamine.

Experimental quantities of a new alkylated aromatic amine, not previously described in the literature, are available from the manufacturer, B. F. Goodrich Chemical Co., 324 Rose Bldg., Cleveland 15, O.

Designated Good-rite *p,p'*-dioctyl diphenylamine, it is oil-soluble and has been designed for uses where a relatively colorless, oil-soluble antioxidant is required. Furnished as a light buff-colored crystalline solid, it is soluble in carbon tetrachloride, ethylene dichloride, ethyl acetate, hexane, benzene, acetone and methanol.

A data sheet is available upon letterhead request to Goodrich's Chemical Sales Department.

Silicone Molding Compound

Silicone resin-glass fiber formulation designed for heat-resistant plastic items.

A new silicone glass molding compound has recently been developed by the Chemical Department of General Electric Co., Pittsfield, Mass. Designated G-E 12810, the new compound consists of a silicone resin and a glass fiber filler and is the first commercially available silicone molding compound.

Outstanding heat resistance is the principal feature of this new material; it withstands continuous operation at 392° F. G-E 12810 also has high impact resistance and excellent arc resistance, as well as good flow in the mold. It will not support combustion and tests show it has no toxicity when burned.

This new compound is ideally suited for circuit breakers, switchgear and

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MONOBUTYLAMINE
Sharples DIBUTYLAMINE
TRIBUTYLAMINE

Raw Materials

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- DYESTUFFS
- RUBBER CHEMICALS
- FLOTATION REAGENTS
- EMULSIFYING AGENTS
- CORROSION INHIBITORS

Available in tank car quantities.

SPECIFICATIONS

	MONOBUTYLAMINE	DIBUTYLAMINE	TRIBUTYLAMINE
Color	water white	water white	pale yellow
Specific Gravity @ 20°/20°C.	0.74–0.75	0.76	0.77–0.78
Acid insolubles (max.)	—	—	0.5%
Amine Content (min.)	96.5%	98.0%	96.5%
Distillation:			
Initial B.P. (min.)	73°C.	153°C.	—
95% Below	81°C.	163°C.	—
95% Between	—	—	199–216°C.
Final B.P. (max.)	85°C.	165°C.	—

For prices and samples write to Dept. A.

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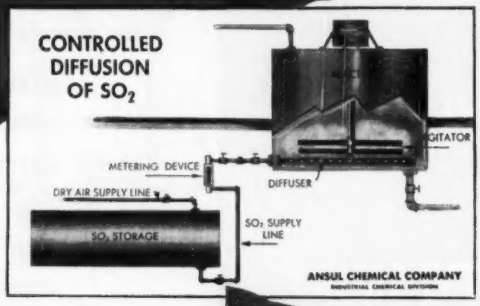

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other parts where resistance to extreme heat and impact is necessary. Its unusual properties offer industrial designers many possibilities for new and better designed products.

Ion-Exchange Bed Signals Exhaustion

Automatic color change allows user to monitor exchange capacity.

A special dyed mixture of Amberlite resins which changes color as the bed becomes exhausted has been developed by the Resinous Products Division of Rohm & Haas Company, Philadelphia. Addition of the new indicating feature affords a simple means of checking qualitatively the exhaustion point of the bed.

Dyed a dark blue in its regenerated state, the Monobed becomes a yellowish brown when exhausted. The user, operating such a bed in a transparent tube or vessel, can watch the latter color travel slowly down the bed as exhaustion advances. Thus, without instrumentation of any kind, he has accurate knowledge and ample warning of the time when he should regenerate or replace the resins. Capacity of the bed to absorb ionized salts is not exhausted until the brown line reaches the bottom of the bed.

This visual means of determining the end-point depends in operation on the combined performance of an anion exchanger and a cation exchanger. Together, they prevent leakage from the bed and result in a sharp, rather than a gradual separation of colors.

Uses of the new concept are expected to include small-quantity applications where water of extreme freedom from ionic impurities is required at low cost and with a minimum of equipment.

Easy-Processing Vinyl

Faster extrusion and mixing are claimed for a new straight PVC resin.

An improved, easy-processing Geon polyvinyl chloride resin of high molecular weight has been introduced by B. F. Goodrich Chemical Co., 324 Rose Building, Cleveland 15, Ohio. Designated Geon resin 101 EP, the new product is available in commercial quantities.

It has been generally recognized in the vinyl industry that straight polyvinyl chloride resins possess certain advantages in stability, physical and electrical properties. Through a new manufacturing technique, Goodrich has been able to incorporate easy processing features into its straight Geon 101 resin, at the same time maintaining the superior electrical, chemical and physical properties of this material.

Geon 101 EP resin is particularly adaptable to both Banbury and powder mixing, and tests show that marked increases in processing rates are possible

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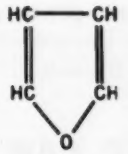
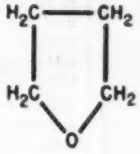


B.P. 31°C.
7 lbs./gal.
Purity 97%+



B.P. 65-67°C.
7 lbs./gal.
Purity 99%+

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Chemical Intermediate

1,4-DICHLOROBUTANE
Chemical Intermediate

$Cl \cdot CH_2 \cdot CH_2 \cdot CH_2 \cdot CH_2 \cdot Cl$

B.P. 155°C.
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Purity 93% +

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WE'VE DONE IT FOR SPRAY MANUFACTURERS

MANUFACTURERS of household sprays, insecticides and disinfectants rely heavily upon aromatics to make their products acceptable to the purchaser for home use. In fact, no manufacturer would risk marketing such a product without employing some effective means of masking the odor of its basic ingredients. This problem of spray manufacturers has recurred so frequently in our laboratories that it is now just a matter of simple routine to prescribe the perfume or deodorant best suited to the job at hand. But all odor problems are not so easily solved. Indeed, many are highly complex . . . which makes us wonder: Is there a complex odor problem to be solved in your business? If there is . . .

PERHAPS WE CAN DO IT FOR YOU! . . .

Perhaps we can show you how to rid your finished merchandise of residual odors detrimental to sales. . . . Perhaps we can introduce an appropriate fragrance that will give your product an appealing and competitive edge. . . . Perhaps we can destroy unpleasant odor conditions arising from manufacturing or processing operations in your plant, thus adding to the comfort and efficiency of your employees. On the chance that we *can* help you, why not drop us a line today? Describe your odor problem and let's see if we cannot correct it for you . . . *economically.*

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at reduced operating temperatures. Tests run in a high speed 3A Banbury with the Geon 101 EP resin showed a 25% reduction in cycle time with unloaded stocks and a 50% reduction with loaded stocks. Powder mixing tests conducted on a Muller type mixer showed reduced cycle time of 50% in producing a dry-free-flowing powder.

In both calendering and extruding with Geon 101 EP, lower processing temperatures may be used than with regular Geon 101: a 5° F. reduction in calendering and 20-30° F. in extruding. Rates of extrusion have been increased 20% with several types of compounds in which the new resin has been incorporated.

Flowable Rubber

Depolymerized rubber is useful as plasticizer, in adhesives and other rubber products.

H. V. Hardman Co., Inc., is now in commercial production of flowable rubber. Known under the trade-mark of DPR, Hardman depolymerized rubber is expected to have wide impact on a number of industries. DPR is actually 100% natural crude rubber solids, containing no solvent or anything other than the rubber itself.

Although the potentialities of DPR have barely been exploited because of its recent introduction, it is already being used in adhesive formulations, conductive rubbers and as a plasticizer for crude rubber and synthetics. It is used to rubberize resins, where it imparts rubber-like characteristics to the resin. Experimentation is under way in many of the fields which will benefit from the advantages of a flowable rubber of low viscosity that does not require the use of solvents.

Tensile strength and elasticity of DPR compounds are not comparable with soft rubber articles fabricated by usual means. However, with special techniques, new articles and methods are now possible which could not be effected with conventional rubber and without heavy, costly equipment.

DPR is now available in a range of closely controlled viscosities from the free flowing, thin-consistency of about 19,000 centipoises at 150° F. to the slowly flowable, heavy-viscosity of well over 100,000 centipoises. The Hardman Co. is located at 571 Cortlandt Street, Belleville, New Jersey.

N-Butylacetanilide

Promising tick repellent available on small scale from Dow.

N-Butylacetanilide, a chemical that has been investigated by the U. S. Public Health Service and found promising as a tick repellent, is semi-

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Benzyl Benzoate
Benzophenone
Diethyl Phthalate
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. . . became so popular before the war that their return to this market is of great importance. These high melting, hard waxes produce lustrous films of excellent durability. They are unsurpassed in the manufacture of polishes, carbon paper and the many fields where their unique qualities may be utilized. Colors range from light yellow to dark brown.

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commercially available from Dow Chemical Co.

The research work was conducted by Dr. James M. Brennan of the Rocky Mountain Laboratory, Hamilton, Montana. The tests showed this material to be more effective over a longer period of time than any of the other materials tested.

The testing, which was conducted at Camp Bullis, Texas, consisted of impregnating clothing or uniforms with two ounces of N-Butylacetanilide in solution per uniform and exposing them to ticks and other insects. Effectiveness was noted daily over the time of the experiment.

• A new, high-purity **ferrous ammonium sulfate,** now being manufactured by the Edgewater Chemical Division of Eimer and Amend, New York, assures greater accuracy in analytical determinations by oxidation-reduction methods. When analyzed by American Chemical Society methods, this reagent is said to contain copper, zinc, manganese and phosphates in amounts less than 0.000%; ferric iron, 0.005%; insoluble materials, 0.01%. It is made from Swedish carbon steel low in alloying elements, and by processes which assure highest purification. It is available from Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Penna.

• Total **water hardness,** or the hardness caused by calcium alone, now are accurately measured in approximately one minute in a method developed by Hall Laboratories, Inc., Pittsburgh. The new Hagan Total Hardness Test or Calcium Test involves a simple, direct titration with a distinct color change at the end point, so that the possibility of error due to subjective judgment is eliminated.

• Mac Dermid Inc., Huntingdon Ave., Waterbury, Conn., has introduced its Alumetex process which eliminates many of the difficulties encountered in **electroplating on aluminum.**

Some of the features of the Alumetex process are: One process for all regularly used alloys of aluminum; Corrosion resistance and adhesion obtained by simple immersion treatments; Elimination of blisters, pits, and dull deposits; Processes sand castings, die castings, and wrought aluminum through the same cycle.

• Recent improvements in manufacturing technique by City Chemical Corp., 132 W. 22nd St., New York 11, N. Y., have resulted in a greatly improved chemically-pure grade of **silver iodide.** The company is prepared to ship promptly any reasonable amount of the new quality.

New Use Data for INDULIN
(Pine Wood LIGNIN)

Indulin in Asphalt Emulsions

INDULIN is a very useful stabilizer for slow break (soil stabilizer) asphalt emulsions using resin acid soaps as emulsifying agents. Using INDULIN, emulsions can readily be prepared to pass cement, demulsibility, and miscibility tests, as well as meeting viscosity and residue specifications.

The preferred procedure for using INDULIN in formulas such as those given here is to first dissolve INDULIN C or slurry INDULIN A in water. Liquid caustic soda and then other chemicals are added. This solution is then added concurrently with the hot asphalt to the emulsifying machine. Good stable emulsions result. It is also possible to add INDULIN C to even a finished emulsion which fails to pass stability tests, and thus bring it within the specifications, although this is not the preferred method.

Typical formulations are outlined below and our Development Department has available other standard formulations. This group is also prepared to work other standard formulas to meet individual requirements.

ASPHALT EMULSION FORMULA #1		ASPHALT EMULSION FORMULA #2	
INDULIN C	150 lbs.	INDULIN A	105 lbs.
Resin Acids	200 lbs.	Resin Acids	200 lbs.
Caustic Soda (dry basis)	31 lbs.	Caustic Soda (dry basis)	41 lbs.
Water	770 lbs.	Water	770 lbs.
Venezuelan Asphalt	2900 lbs.	Venezuelan Asphalt	2900 lbs.

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Leader Bldg. 526 Superior Ave., N. W. Cleveland 14, Ohio

NEW EQUIPMENT

Anemometer

New electrical anemometer free of the effects of rate of change of temperature.

The new Model G Air-Meter of Hastings Instrument Co., Hampton, Va., provides instantaneous, direct, accurate readings of air velocities from 5 to 6,000 feet per minute with an expanded scale

in the low velocity ranges. It is now available with built-in temperature compensation to prevent momentary error in velocity reading when the probe is subjected to sudden temperature changes.

Available accessories include a carrying case with battery operated power pack for use when 110 volt AC power supply is not available.

Relief Valves

New relief valve has operating mechanism in cartridge.

A new cartridge type of hydraulic relief valve is available for pressure settings ranging from 100 to 5000 psi. from the Hydraulics Div. of Pantex Mfg. Corp., Pawtucket, R. I. The new valve opens and closes within a 7% differential. Even smaller operating differentials can be had for special applications if required. Constant repeat accuracy is not disturbed by full load shocks and surges.

The design eliminates wire draw and provides high volume flow at all pressures. This frequently permits the use of a smaller unit, thus conserving weight, space and costs.

The valve has been tested through temperature variations ranging from —65° F. to 160° F. with no more than a 5% change in operating characteristics.

The entire operating mechanism is contained in a cartridge which is so designed that it may be easily replaced without breaking the line. Pressure adjustments are made quickly and easily by means of an accessible adjustment screw.

Hydroblender

New device makes water "wetter" at point of use.

An automatic, self-draining Hydroblender for the introduction of chemicals that will "wet" water at the point of use, has just been introduced by Aquadyne Corp., 220 E. 42nd St., New York 17, N. Y.

Made of brass castings and fittings and a tube of Lucite, the Hydroblender weighs approximately 35 pounds.

Chemicals are placed in the Lucite tube in the form of water-soluble capsules. There they dissolve in proper proportion to the water passing through a built-in venturi nozzle to make "wet water" (reduce surface tension).

Principal applications of the Hydroblender are in industrial dust control and product wetting, blending, mixing and washing.

Freeze Drying

New unit uses selective absorption of radiant heat in freeze drying.

A new unit for drying heat sensitive materials, even while frozen, using a radiant heat source better than infra-red lamps or high-frequency dielectric equipment, has been introduced by Proctor & Schwartz, Inc., 7th Street and Tabor Road, Philadelphia 20, Pa.

The process was developed for commercial use by the Dry-Freeze Corp. and Proctor & Schwartz, Inc. manufacture the equipment.

This method uses infra-red radiation in certain very effective wave lengths in the "fundamental vibration region" where radiant energy is absorbed selectively by different materials, depending on the chemical composition of the material. This makes it possible to select radiation in the region where the greatest percentage of the total energy will be absorbed by the water in the product to be dried. This is an ideal method for driving off the water and thus drying materials which are damaged by temperatures above 100 degrees F.

Material may be in glass containers or on trays. Special trays are used with bottoms transparent to this radiation which is applied only through the bottom of the tray.

While large installations are likely to be tailor-made for individual product requirements, a compact, general purpose self contained unit is available for laboratory or small-scale production use.

Viscosity Control

New unit provides continuous and automatic viscosity control.

Viscotrol of Brookfield Eng'r. Labs., Stoughton, Mass., is a viscosity measuring, signaling and transmitting unit, designed for use where viscosity variations during production normally occur only in one direction and it is desired to accomplish continuous and automatic viscosity control.

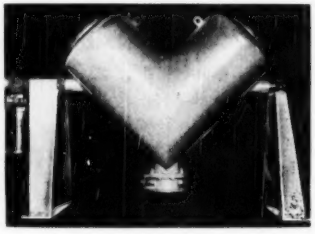
When installed, the Viscotrol does away with tedious, inefficient manual methods of viscosity control by continuously measuring and signaling viscosity variations and also either automatically activating various means of returning the viscosity to an optimum value or automatically shutting down the process until the viscosity condition has been corrected.

The Viscotrol can be supplied to control any working viscosity from 2 to 50,000 centipoises and the instrument will respond to any viscosity change within 1% of the particular value for which it is set. Installation can be made on closed, open or pressure systems, either directly to present equipment or to easily added sample chambers or by-pass lines.

Blender

New rotary V blender for dry powders available.

The P-K twin shell blender, a development of the Patterson-Kelley Co., Inc., 16 Burson St., E. Stroudsburg, Pa., consists of two cylindrical shells of equal diameter so joined as to form a V rather than a long straight tube. This V-shaped

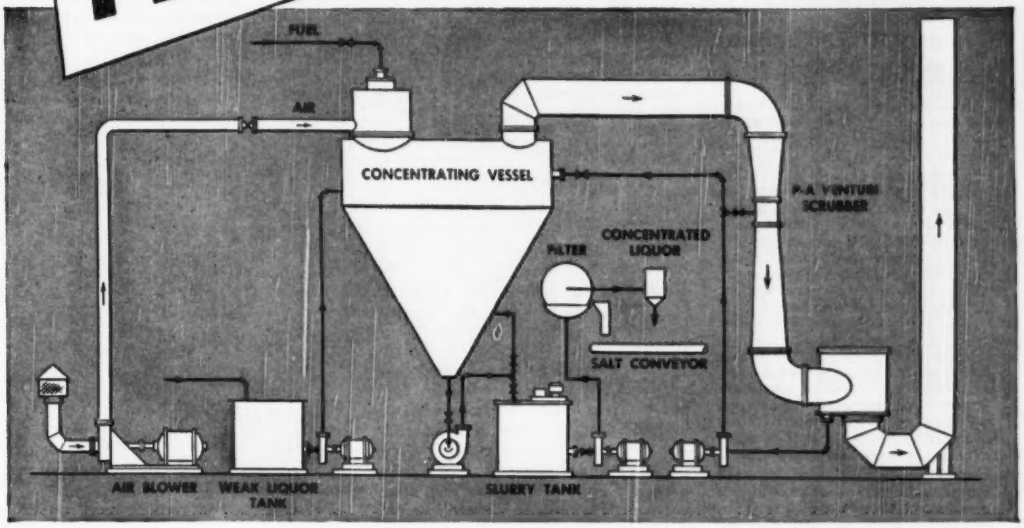


unit rotates about a horizontal axis passing through approximately the geometrical center. A dust-tight discharge valve is located at the apex or point of the V; standard access covers with swing bolts and dust-tight gaskets are located at the end of the two legs. If necessary to prevent dust while loading, the machine can be set in the reverse position (∧) and fed through the discharge valve.

In operation, the unit is set in normal upright position and charged through

Recover Sulfuric Acid FROM WASTE PICKLING LIQUOR

...With The New Chemico High Temperature Concentrator

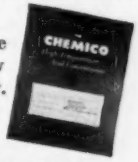


HERE, at last, is a practical and profitable method of recovering sulfuric acid from waste pickling liquor. This liquor, containing sulfuric acid and ferrous sulfate is concentrated by subjecting it to high temperature combustion gases released under the surface of the liquid. During this operation, part of the pickling liquor is continuously withdrawn and precipitated sulfate removed by filtration.

The free sulfuric acid can be concentrated to any reasonable strength, with either a one or two-stage process. Ordinarily single stage concentration is used for acid strengths up to 70% where practically all of the ferrous sulfate is removed. Further concentration to 93% may be effected in a second stage.

If complete recovery is desired, this sulfate can be roasted with coal or pyrite to produce iron oxide sinter and SO_2 which is then purified and processed to additional sulfuric acid in a conventional contact plant.

NEW BULLETIN S-112 contains more complete information on this new Chemico High Temperature Concentrator. Send for your copy today.



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Permanite Pipe and Duct Work is an outstanding new development in the field of corrosion-proof light weight pipe.

It is unsurpassed for installations where size, weight and corrosion resistance are factors of prime importance. Permanite is exceptionally light in weight, yet very strong with a hard, non-absorbent surface and is corrosion-proof throughout its entire body. It is made from a Knight-developed special furan resin, reinforced with Chemical Fiberglas, Nylon or Orlon (depending on service) for greater strength. This same basic material has been used for several years with marked success in Permanite-Constructed functional units such as: HCl Absorbers—Fume Washers—Absorption Towers—Process Tanks—and many others.

Properties
Permanite Pipe and Duct Work is resistant to all non-oxidizing acids, alkalies, organic solvents, thermal shock and temperatures to 280° F.

Sizes
Available in any size from 1½" I. D. to 36" I. D. A complete line of fittings may be had in all sizes. Special types can be made to specifications.

Weight
Extremely light in weight. A 6 ft. length of 6" I. D. x 3/8" wall Permanite Duct Work weighs only 30 lbs. It may be installed to walls, roofs or ceilings that would not support the heavier conventional types.

Installation
Wrapped or metal flanged joints may be used. Permanite may be cut, sawed and drilled with ordinary tools and equipment. Requires less labor, less time to install and fewer supports.

Write for Permanite Pipe and Duct Work Bulletin—No. 204

MAURICE A. KNIGHT
204 Kelly Ave., Akron 9, O.

Acid and Alkali-proof Chemical Equipment

either or both access openings until about half full (this point varies with different products). With valve and access openings closed, the machine is rotated slowly about the horizontal axis. In a few minutes, the time varying according to different products, a perfect blend is obtained. After setting the machine at normal vertical position (V), the mixed product is discharged through the discharge valve. If the unit requires cleaning out after each blend, it can be easily done through the access opening. There are no baffles or other obstructions to retard cleaning or to cause products to "hang up" and prevent thorough mixing while in operation.

Sizes range from 1 to 300 cubic feet capacity. Power requirements (based on materials of 50 lbs. per cubic foot density) range from ¼ to 20 hp. Other drives available for heavier products. Standard motors supplied are integral gearhead type with built-in magnetic brake for close control in "spotting" the unit for charging and discharging.

Small test blenders built of strong, transparent plastic to watch blending and check its effectiveness are available.

Agitator

New agitator uses fluid motor.

A new variable speed hydraulic agitator for pilot plant and production use, said to surpass the conventional set-speed type for flexibility, convenience and safety, has been introduced by Emerson-Scheuring Tank & Mfg. Co., Inc., 21st St. & Martindale Ave., Indianapolis 7, Ind.

The new agitator (patent applied for) is powered by a directly connected fluid motor, driven by an electrically operated hydraulic pump. The fluid motor occupies a space of only 12 to 16 inches in diameter on the tank top and leaves more room for manholes, nozzles and other openings. Headroom requirements do not usually exceed 24 inches. Further space economy, plus increased safety in processing hazardous substances, may be obtained by locating the electric motor and oil reservoir at any distance from the tank or vat—beyond a firewall, if conditions warrant. Controls may be arranged for the operator's convenience.

The new agitator is available in sizes ranging from 1 to 50 hp.—larger sizes may be obtained on special order. The unit provides infinitely variable speeds ranging upwards from 15 rpm.

Solenoid Valves

A new line of solenoid valves is available for hard-to-handle liquids and gases.

The new solenoid valves of Charles Engelhard, Inc., 850 Passaic Ave., E. Newark, N. J., are hand-made and engineered for precision seating. The solenoids are hand wound, completely moisture proof and oversized to assure high ratio of power to friction. Laminated cores keep operating current to a minimum.

Valve bodies are heavy, are made of non-corrosive metal and are bolted to the bonnet. Valve stems and discs are in one piece and are fabricated of stainless steel. The hermetically sealed plunger tube is of high tensile strength and is non-corrosive.

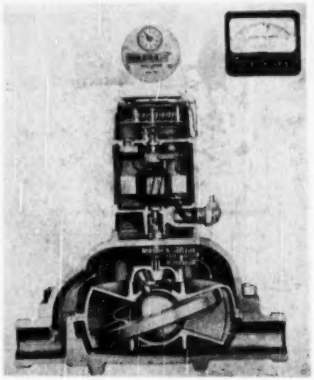
Valve body is joined to the bonnet with a flange and gasket to provide a tight seal, yet can be taken apart easily without distorting valve body and seat. Power supply can be AC or DC.

Meter & Control

New meter and control produced by Hays Corp.

The Hays Corp., Michigan City, Ind., now is producing the Veriflow meter and Veritrol for indicating and controlling the rate of flow of corrosive liquids.

The Veriflow meter is volumetric as each complete movement of the



measuring piston displaces a fixed volume of liquid. The liquid enters through the inlet port and fills the spaces above and below the piston. The volume of liquid flowing in the annular space around the center ball of the piston causes the piston to move with a "nutating" motion until the liquid discharges through the outlet port. The center port of the piston is thereby caused to make a circular motion which is transmitted through a gear train to the drive shaft which passes through the stuffing box to the direct connected generator through a self-aligning coupling. The rate of flow indicator can be mounted remote from the rest of the meter.

With the Veritrol a knob is set to give the rate of flow desired. This automatic control indicates and integrates liquid flow and is automatically controlled. The output of the meter generator is measured by a con-

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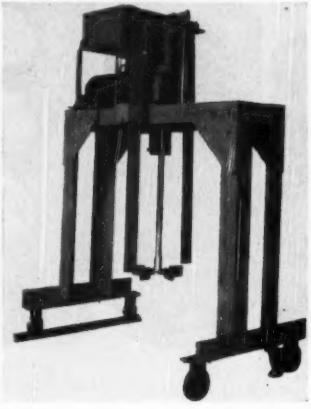
tact-making relay which, through its contacts and reversing relays, operates a motor to position a control valve. This valve controls the rate of liquid flow through the meter until the generator output balances a potentiometer circuit at the rate of flow for which it has been set.

Agitator

Single agitator serves up to 40 tanks.

A new heavy-duty liquid agitator developed by Mixing Equipment Co., Inc., 1024 Garson Ave., Rochester 9, N. Y., can be moved quickly from one tank to another for batch mixing and blending. A single unit will serve up to 40 tanks, in any order desired.

The unit was originally developed for paint tinting, an application that requires a heavy-duty, easily movable unit, capable of being quickly removed from one tank and inserted in the next. Operating tests indicate that



the new agitator will handle the tinting process in one-eighth to one-sixth the time formerly required.

The new Lightnin agitator is a turbine-type unit. When connected to plant electrical supply, it is ready to operate. Mounted on casters, it rolls on a track from tank to tank as required. Correct mixing speed for each individual batch can be selected with a simple variable speed control.

The impeller shaft and turbine-type impeller are raised and lowered in the tank hydraulically. To switch from one tank to another, the operator merely sets two levers, releases a floor lock and wheels the unit to its new position.

No tank baffles need be installed, because the new Lightnin agitator is fitted with two integral baffles that raise and lower with the impeller. These baffles are designed to promote rapid and thorough mixing. They eliminate the expense of attaching baffles to a number of tanks.

Back Pressure and Relief Valve

New valve maintains steam pressure anywhere between 0 and 20 psi.

A new back pressure valve has been developed by Klipfel Valves, Inc., Division of Hamilton-Thomas Corp., Hamilton, Ohio. It is made in two types: Type 135VW will maintain steam pressure at any desired point between 0 and 20 psi; Type 136VW is an atmospheric relief valve for vacuum service. The new multiport valve is a logical development of the patented Klipfel No. 135 back pressure valve and is fundamentally an assembly of several of these single port valves.

The inner valve consists of an inverted cup which slides on a piston cast integral with the valve seat. Inlet pressure enters the chamber between the cup and piston through a restricted opening in the center of the piston. The narrow seating edge of the cup eliminates nearly all the venturi effect of high velocity steam which is the prime cause of poor regulation and chattering; in addition, the restricted opening into the cup chamber makes it an effective dashpot.

With these new back pressure valves, "wire drawing" and "hunting" with pulsating flows are virtually eliminated because the individual valve units can be set to open in sequence. Thus, at small increments of pressure, only one valve at a time is in a throttling postion.

Individual and positive testing or setting of each valve unit can be done without dismantling the valve. Moreover, repairs or replacement of one of the units does not prevent operation of the valve as a whole.

This very practical feature is possible because the units are independent of each other and because the large capacity of the valve permits operation without one of the units.

Welded, all-steel construction of the valve body provides strength with a minimum of weight; all vertical loads are carried by struts to prevent distortion of any part of the valve. For installations requiring frequent adjustment or water sealing, suitable accessories are available.

• A completely new line of Pycnorator instruments for **measurement and control of fluid density and specific gravity** has been introduced by the Fischer & Porter Co., Hatboro, Pa. Among the various designs available are submerged float instruments for use in vessels under pressure or vacuum, open bubblers, closed diaphragms and hydrometer types.

• The Wallingford Steel Company, Wallingford, Conn., will supply **resistance welded steel tubing,** in stainless, carbon, alloy, cold rolled or hot rolled stock, from 1010 to 1035 analyses, ½" to 3"

How much should a valve cost?

Only as much as is necessary for it to meet all the conditions under which it must operate.

When the service in which a valve is to be used requires special design and materials, it is poor economy to try to make an inexpensive valve do the job. "Down time", maintenance costs, if not actual valve failure, will far more than offset any initial saving.

On the other hand, in a majority of services, standard Powell Valves satisfy all requirements for long, trouble-free performance.

And, because Powell makes all kinds*, it is the soundest economy to standardize on Powell Valves for all your flow control requirements.

Fig. 1708—200-pound Bronze Globe Valve with screwed ends, union bonnet, renewable, specially heat treated stainless steel seat and regrindable, renewable, wear-resisting "Powellium nickel-bronze disc.

Fig. 1830 — 200-pound Nickel Gate Valve with screwed ends, screwed-in bonnet, inside screw rising stem.

Fig. 2433-M—150-pound Monel Metal Swing Check Valve with flanged ends and bolted flanged cap. Disc has ample lift to permit full, straightway, unobstructed flow through the valve body.

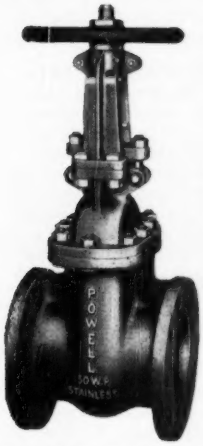
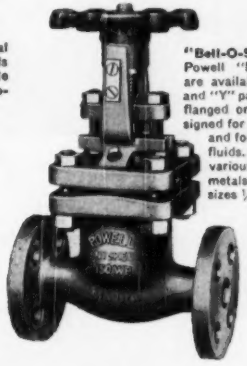


Fig. 2453-G — Large 150-pound Stainless Steel Gate Valve with bolted flanged yoke-bonnet, outside screw rising stem and tapered solid wedge. Available in sizes 5" to 30", inclusive.



"Bell-O-Seal" Globe Valve. Powell "Bell-O-Seal" Valves are available in Globe, Angle and "Y" patterns, with screwed, flanged or welding ends. Designed for high vacuum service and for handling hazardous fluids. Can be furnished in various corrosion-resisting metals and alloys. Made in sizes ¼" to 12", incl.

Fig. 1793 — Large 125-pound Iron Body Bronze Mounted Gate Valve with flanged ends, bolted flanged yoke, outside screw rising stem and tapered solid wedge. Also available in All Iron.

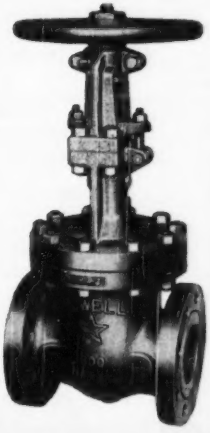


Fig. 3003—Class 300-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke, tapered solid wedge.

***The Complete Powell Line includes Globe, Angle, "Y", Gate, Check, Non-return, Relief, and Flush Bottom Tank Valves in Bronze, Iron, Steel and a wide range of Corrosion-resistant metals and alloys.**

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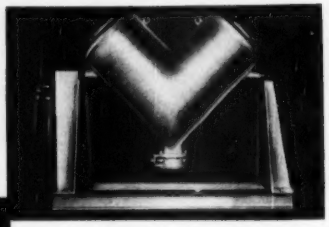

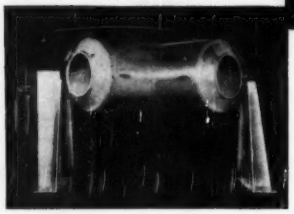

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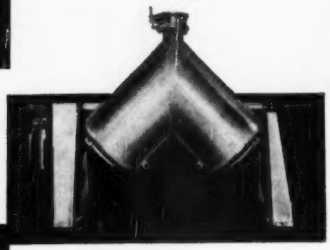

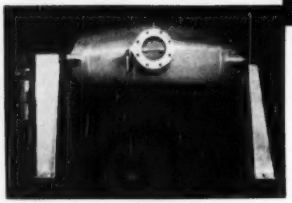

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• A new "Karbate" impervious **graphite globe valve** is available from National Carbon Div., Union Carbide and Carbon Corp., 30 E. 42nd St., New York 17, N. Y. The valve, in 1" and 2" sizes, is designed for shut-off and throttling service with corrosive fluids free from abrasive solids. Except for the Teflon packing all valve parts in contact with the fluid are "Karbate" impervious graphite. The tapered disc valve seat controls fluid flow, and is self-reseating.

• Built to work with all Micromax and Speedomax Rayotube instruments, this new Rayotube **radiation pyrometer** of Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa., has a quick-sighting optical system which lets user select desired target easily. The hermetically sealed construction at lens, window, and leadwires keeps out dust and gases.

The unit requires no protection against high ambient temperature unless its housing temperature exceeds 350° F. Below that point, any previously installed water- or air-cooling can simply be turned off or disconnected.

• Gra-Lite, **chemical resistant fabric**, developed by the Standard Safety Equipment Co., 232 W. Ontario St., Chicago 10, Ill., resists a wide range of chemical hazards, including—with special preparation of the compound—anhydrous hydrogen fluoride. It is possible to seal over garment seams and prevent chemical seepage. For maximum worker comfort, Gra-Lite is more than 40% lighter than the ordinary impervious fabric and extremely flexible—even under freezing temperatures this fabric retains its flexibility.

• A new induced draft Bifurcator **fan** for boiler application is now being marketed by DeBothezat Fans Div. of American Machine and Metals, Inc., East Moline, Ill. The Bifurcator is a direct motor driven fan with a divided housing. Motor is in an isolated asbestos-lined chamber around which flue gases are by-passed. Standard induced draft Bifurcator fans range from 12" through 27" for boilers from 6 HP (200,000 BTU/hr.) up to 350 HP (12,000,000 BTU/hr.) for operating temperatures up to 650° F.

• Designed for pipe lines handling slurries, sludges, or gases containing a high percentage of solid particles, these new Kwikleen **heavy duty valves** of W. S. Rockwell Co. 200 Eliot St., Fairfield, Conn., provide full flow for line pressures to 100 psi. The new valve may be quickly cleaned of accumulated solids without removing them from the line. A cover plate is provided at the bottom of the sediment

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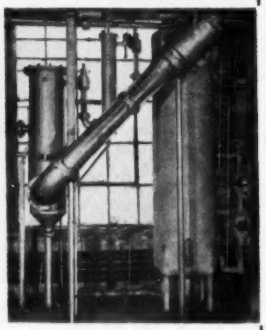

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chamber, held in place by through bolts and eye bolts. By removing the through bolts and loosening the nuts of the eye bolts, the cover plate is readily swung out of place for dropping out the accumulation in the sediment chamber.

This line of valves has been standardized in the following pipe sizes: For lever handle control—4", 6", 8", 10" and 12". For rising stem hand wheel control, chain wheel control and air cylinder control—4", 6", 8", 10", 12", 14", 18", 20" and 24".

• Corning Glass Works recently began shipments of a new type of industrial **glass pipe**, Pyrex brand double tough glass pipe. The new product is even better than existing glass piping. New features include: heat strengthening of all standard fittings —except "U-bends"—and ends of all straight lengths; 50% closer tolerance on length, flatness, angularity and bow. There will be no increase in price.

• The adjustable cam of the No. 235 **adjustable lift-opening lever operated control valve** of Atlas Valve Co., 282 South St., Newark, N. J., provides an easy method of fixing the valve lift to maintain a ratio. This is also true where the flow of two fluids must be kept within a certain ratio.

• A new technique has been developed for making **glass orifice plates** by the Precision Thermometer and Instrument Co., 1446 Brandywine St., Philadelphia 30, Pa.

The advantages of dimensional stability and corrosion resistance of glass orifices has always been recognized, but the high cost of production has limited use because Pyrex glass orifice plates can now be made economically to extremely close tolerances maintaining sharp square edges where required. Both inside and outside dimensions are diamond wheel ground. Glass orifice plates are available in various thicknesses from ¼" up and in sizes up to 16" O. D.

• Quick removable screen plates and wear plates are major improvements in the new model McNally Carpenter **centrifugal dryer.** This dryer will continuously handle wet material up to ⅜" round hole equivalent.

• Industrial Process Engineers, 8 Lister Ave., Newark, N. J., has constructed a new "Standard-Plus" **vacuum pan drier.** The unit is designed for a jacket working pressure of 50 psi. All parts of the unit in contact with the contents are type 316 stainless steel. The agitator, which has no internal bearing, consists of an anchor with spring-loaded scrapers driven at 40 rpm by a 2 HP right-angle gearmotor. In addition to the charge port

(*Turn to page 628*)

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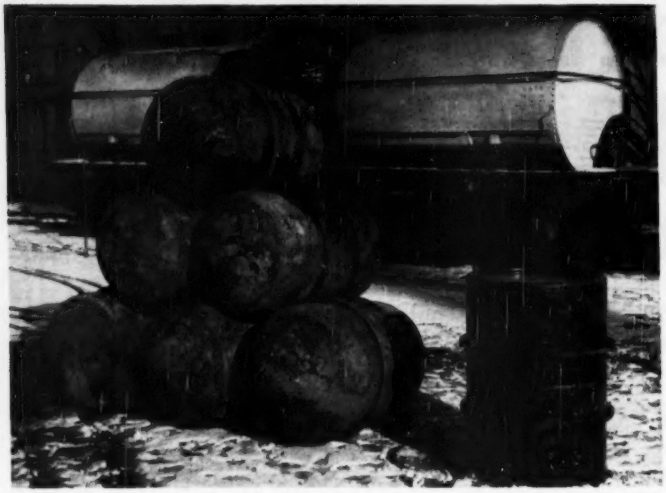


Object lesson in drum selection: ICC 5 A acid drums at the left looked like the one on the right before they were subjected to tremendous pressures caused by a fire. Their sturdy construction prevented rupture and possible disaster. While drums aren't expected to undergo such hazards, if lighter drums than the specification container had been used, the shipper might have been responsible for a serious accident.

Growing Number of Metal Drums Makes Knowing "Specs" a Shipper's "Must"

FOR A NUMBER of years when a metal container was mentioned as a package in the chemical industry it referred to a plain black iron drum. Although development of the specifications for metal containers for transportation of dangerous articles centered around the black iron drum through the years, with the development of alloys and their subsequent use within the chemical industry, several types of alloy drums were approved for the shipment of hazardous chemicals. In addition to these alloy drums, other containers of black iron were developed so that the number of metal drums now approved by the Interstate Commerce Commission for the transportation of hazardous chemicals is sizable.

Since it is the responsibility of the shipper to select the proper container for his product, manufacturers who ship hazardous liquids, powders, semi-solids or viscous materials owe it to themselves to become fully acquainted with specifications for metal drums. This article is one of a series in which types of containers for different services will be described, and pertinent specifications and regulations will be reviewed as a chemical shippers' guide.

The original specification for a metal drum under the ICC Regulations was the ICC 5A specification commonly referred to as the acid drum. The ICC 5A drum is the master specification for the 5 series of drums which comprise specification containers ICC 5, ICC 5B, ICC 5C, ICC 5D, ICC 5F, and ICC 5G, H, K, M, and X. Continuing the master specification of ICC 5A, Specification ICC 6A, 6B, 6C, and 6J are also approved specification containers. All the specifications in the ICC 5 series and the ICC 6 series are commonly referred to as returnable drums. A brief outline of these drums follows:

The ICC 5A drum must be constructed with sheets for body and head of low carbon, open hearth or electric steel, and in gauges of 12 gauge for the 110 gallon size to 16 gauge for 10 gallons or below. Specification for the rated capacity of all drums under the ICC 5 and 6 series are the same and read as follows:

Rated capacity as marked, see paragraph 11 (c). — Actual capacity of straight-sided containers shall be not less than rated (marked) capacity plus 2 per cent, nor greater than rated capacity plus 2 per cent plus 1 quart, except that for containers over 30 gallons marked capacity, actual capacity shall be not less than rated capacity plus 2 per cent nor greater than rated capacity plus 2 per cent plus 1 gallon; actual capacity of bilge-type containers must be not less than rated capacity, nor greater than rated capacity plus 2 per cent plus 1 gallon.

This heavy type drum is generally used for corrosive liquids which do not affect to any appreciable degree the steel from which they are manufactured.

ICC 5 conforms in many respects to the ICC 5A drum except that the minimum thickness extends from 14 gauge for the 110 gallon drum to 22 gauge for th 5 gallon container. This drum is authorized for somewhat less hazardous chemicals, particularly flammable materials and alkaline corrosive materials.

ICC 5B is similar in many respects to ICC 5, one of the chief differences being that roll or swedged-in hoops may be used for certain gauges in the larger size drums, mainly 55 and 110 gallon capacity. This makes for a somewhat less expensive container but is generally approved for movement of less hazardous materials similar to those approved for ICC 5. There may be instances, however, in the Regulations whereby an ICC 5 drum may be approved and a 5B drum not approved but this is exceptional.

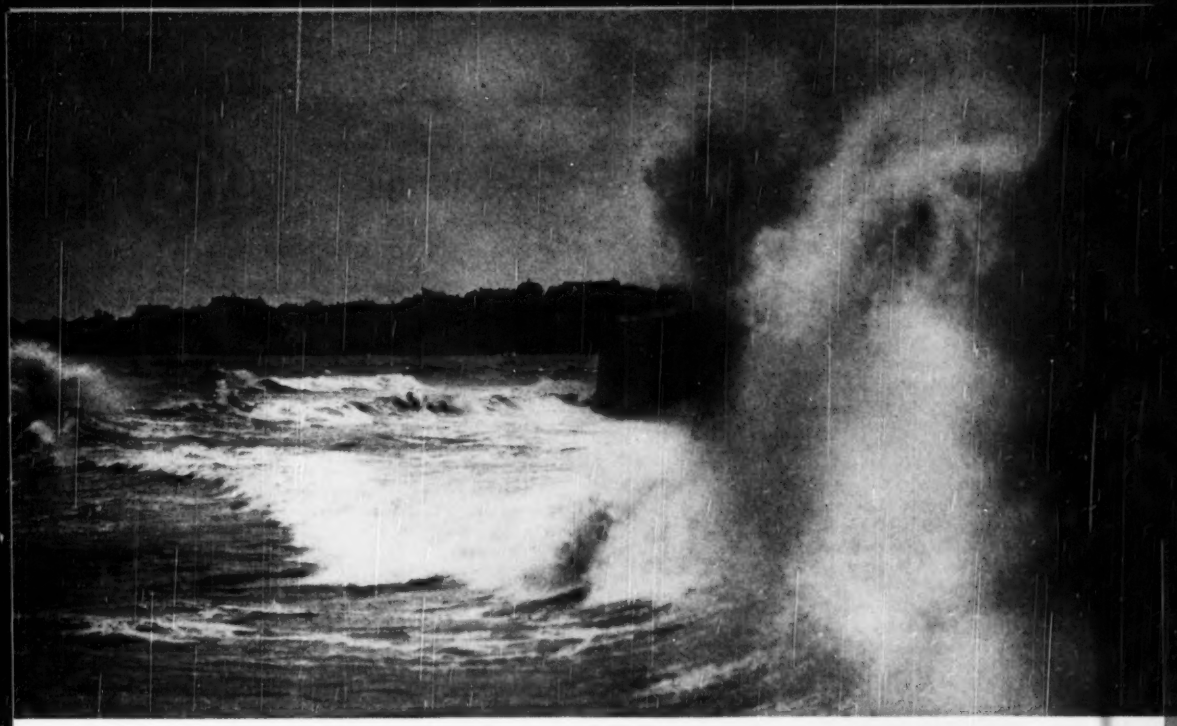
Stainless Steel Drum

Specification ICC 5C is a stainless steel drum and also the first ICC container approved for an alloy. It is commonly referred to as the nitric acid drum since its use for nitric acid has increased considerably during the past few years. Following is the specification of composition for this drum:

(a) All sheet metal, welding rod, closing devices, and samples taken from the welded portion of the finished container must be of Type 304, 18 chrome 8 nickel alloy with 0.08 percent carbon maximum, 18-20 percent chromium, 8-11 percent nickel, or other types of stainless steel of equivalent corrosion resistance and physical properties.

(b) Type 304 or other grades of equivalent corrosion resistant containers in the as-welded condition are permissable for nitric acid concentrations up to and including 78 percent. Type 304 containers in the heat treated condition (quenched from 1900° F.); or stabilized Type 347 in the as-welded condition, stress-relieved condition (1550-1650° F.); heat treated condition (quenched from 1900° F.); or other grades of equivalent corrosion resistance are permissable for all concentrations of nitric acid.

(c) All parts of any completed container exposed to lading must comply with the standard 65 percent boiling nitric acid test in that the limit of inches per month penetration in accordance with corrosion test as used in American Se-



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• These specialized St. Regis Multiwall Paper Bags were developed for products requiring high resistance to oil, grease, moisture, alcohol, alkalies and most acids. The coated ply is an inner layer—inert, odorless, non-toxic. It gives even greater strength to the tough St. Regis kraft Multiwall.

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ciety of Testing Materials Committee A-10 1933 collaboration testing program, shall be 0.0015 inch, this figure to be an average of five 48-hour tests.

The recent development of the 15-gallon drum for nitric acid will increase the use of specification ICC 5C within the chemical industry.

Specification ICC 5D commonly referred to as a rubber-lined drum is still in the Regulations although there is very few of this type of drum in service. This department will comment in a future article on all rubber-lined drums which appear to be more practical containers than rubber-lined steel drums.

ICC 5F is a special container with a rated capacity not over 11 gallons and must be constructed with body and head sheets at least 14 gauge U.S. standard. This container must withstand hydrostatic pressure test of 125 pounds per square inch sustained for five minutes as compared to a hydrostatic pressure test of 80 pounds per square inch which is the requirement for a 5A container.

ICC 5G must be manufactured with an austenitic 18 and 8 chrome nickel alloy with carbon content not over 0.08%. This container may be constructed of lighter gauge metal for the various capacities that are authorized for the ICC 5C stainless steel drum. It is obviously a less expensive container than the ICC 5C drum and may be used for various less hazardous materials than are required for the ICC 5C drum. It is well to note, however, that the ICC 5G drum while being manufactured of stainless steel, is not approved in any form for the shipment of nitric acid.

ICC 5H is a lead-lined drum and while there are some of these still in service, they are not widely used within the chemical industry. However, this specification allows the manufacturer of a drum comparing in most respects with ICC 5A specification but with a lining of lead at least 3/32" thick completely bonded to the steel.

Nickel Drum

ICC 5K is commonly referred to as the nickel drum and must be manufactured of nickel at least 99.0% pure. This is another instance whereby a metal found to be satisfactory for the shipment of hazardous products has been fabricated into drums and has become one of the important ICC specification containers. It is used extensively for the shipment of various chlorides, particularly phosphorus trichloride and phosphorus oxychloride.

Specification ICC 5M is a monel drum which must be entirely constructed of monel except for rolling hoops and chime reinforcements. This container must also, regardless of size, be constructed of a minimum thickness of 14 gauge. This is a recent addition to the ICC specification for metal drums that was approved about a year ago and it probably will have several applications in transporting hazardous chemicals.

ICC 5X is an aluminum lined drum which must be constructed to all specifications of ICC 5A with the exception of closure requirement and must have a lining of aluminum 99% pure, thickness 0.12 inches with all seams welded. This is a liner which must have a reasonably good fit in outside drum and be arranged so that extensive movement therein must be prevented. This container does not have a great amount of use in the chemical industry. However, it is an authorized specification container.

Hazardous Materials

ICC 6A, 6B, 6C and 6J are metal drums authorized for several corrosive flammables and oxidizing materials. Wherein ICC 5A does not permit a removable head container ICC 6A does permit this feature. The 6 series of returnable drums are commonly used for hazardous materials where a full opening is required to remove the contents. In many cases if the material to be shipped is of a liquid type, the ICC 5 specification containers are used; and if the hazardous material is viscous, semi-solid, or solid and a steel drum is required, the ICC 6 series is used.

In this article, ICC 5 and ICC6 series drums which, as stated, comprise the returnable type of metal drum for the transportation of hazardous material, have been discussed. It is well to bear in mind however, that in some cases alternate containers—namely non-returnable type of steel drums—are also authorized, and this type of container will be covered in a subsequent article.

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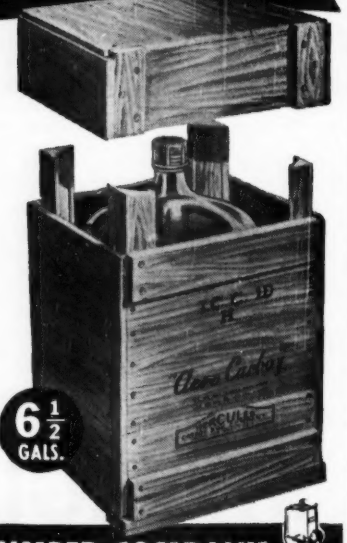

NATIONAL BOX & LUMBER COMPANY
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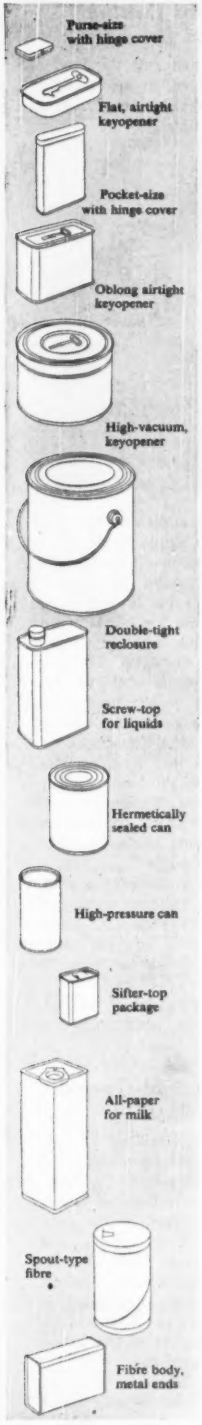
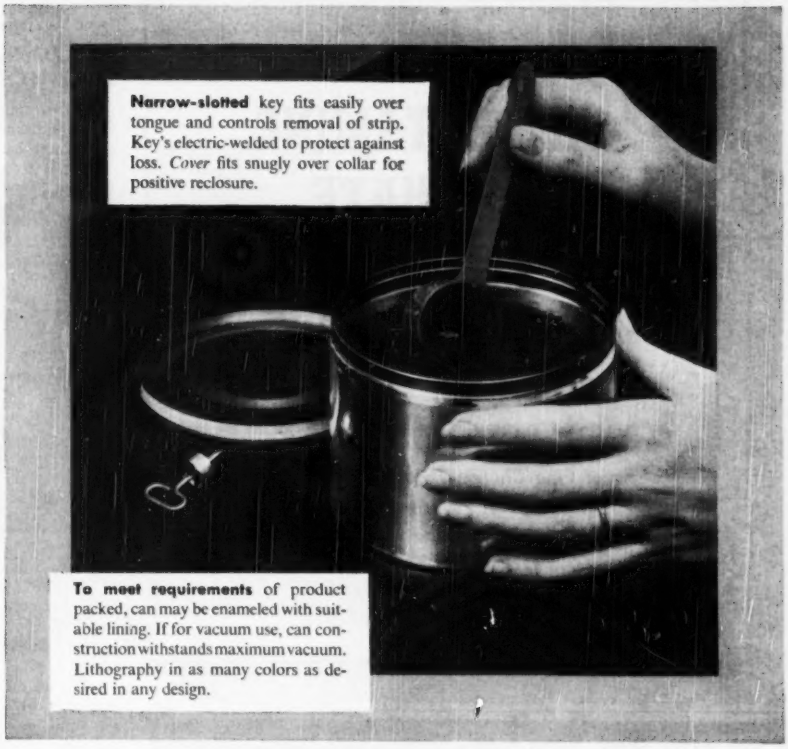
Booklet Explains Testing Shipping Boxes

A new booklet entitled "How to Test Corrugated Shipping Boxes," which has just been issued by The Hinde & Dauch Paper Co., Sandusky, Ohio, describes the various scientific tests and testing equipment used by responsible corrugated box manufacturers to predetermine the efficiency of corrugated boxes in the protection of products in shipment and in storage. Listing the "minimum requirements" as established by the Consolidated Freight Classification Rule 41, postal and express regulations, "How to Test" explains the methods by which box quality is checked against required standards.

This booklet does not suggest that a box user maintain his own testing laboratory, but strongly recommends that the box user understand the basic

WHICH PACKAGE SUITS YOUR PRODUCT?





Narrow-slotted key fits easily over tongue and controls removal of strip. Key's electric-welded to protect against loss. *Cover* fits snugly over collar for positive reclosure.

To meet requirements of product packed, can may be enameled with suitable lining. If for vacuum use, can construction withstands maximum vacuum. Lithography in as many colors as desired in any design.

If reclosure is important to your product—

Take a good look at the container pictured above. Maybe it offers you a new approach to greater sales. Some of its advantages are:

1. **It opens easily and recloses securely.**
2. **It protects your product from air.**
3. **Its shape permits a big eye-catching label.**
4. **Its wide mouth opening allows easy access with large measuring devices.**

IS IT YOUR ANSWER?

This container was invented by Canco for use in vacuum-packing coffee. Its use, however, was extended for vacuum-packing (or gas packing) dry milk, tobacco, peanuts, and other nuts, hard candy, nut brittle and shortening.

It is also used *without vacuum treatment* for chocolates, cookies, fruitcakes, miscellaneous confections and even surgical bandages.

Your packaging problem may be similar. If it is, why don't we talk over the special details together?

Since 1901, Canco has been creating new and more effective packages. There is hardly a major development in the packaging field that this keen organization has not pioneered.

We can advise you on how to build sales, cut costs, improve processes, and on filling and closing procedures. We stand ready to serve you promptly in production-line emergencies. *Call Canco First!*

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fundamentals of testing. It is available from the company on request.

New Device for Cutting Heads of Steel Drums

A head cutter that cuts the head of any size drum, clean, in approximately one minute has recently been introduced

by Michael A. Schinker Mfg. Co., 6514 S. Western Ave., Chicago 36, Ill.

Manually operated, it will work equally well on empty or filled drums, from 10 to 55 gallon sizes and 20 to 16 gauge stock. It sets on the top of the drum. Turning of the crank causes it to complete the circle of the drum. The head will drop into the drum while the cutter remains resting on the open drum. The cut leaves no ragged edges and the metal is flanged slightly inward.

Weighing but 36 lbs., it is portable. It can be used safely on drums containing dangerous vapors. Dangerous torch cutting, saw-toothed edges, hammer and chisel noise of cutting heads are eliminated.

The new cutter is constructed to withstand hard use, and has been thoroughly field tested. It is inexpensive to maintain. The cutter blade will cut about 1000 heads before dulling and can be resharpened.

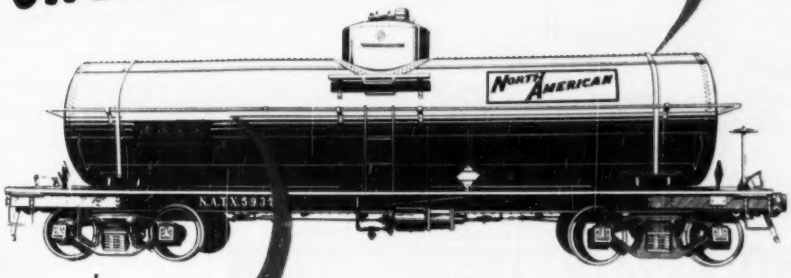
The head cutter also doubles for sealing leaky chimes by replacing cutter wheel with a roller wheel.

Methanol Terminal Opened By Celanese in N. J.

New bulk terminal facilities at Carteret, N. J., for the distribution of methanol have been opened by the chemical division of Celanese Corp. of America. Methanol is produced at the company's plant at Bishop, Texas, and shipped by tanker from nearby Corpus Christi to the New Jersey terminal, from which point it is distributed in tank trucks, tank cars and drums to industrial consumers in the Middle Atlantic and New England states.

This is the second in a series of tanker movements of industrial organic chem-

THIS SYMBOL MEANS SAFETY FOR CHEMICAL SHIPMENTS



This symbol also means service and dependability. It stands for all the helpful transportation knowledge that North American Car has acquired through more than forty years of supplying specially designed tank cars to leading chemical shippers. It is a guarantee of safe, economical railroad shipping.

Do you now have products shipped in drums that have reached tank car capacity? Discuss this with us.

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PHOSPHORUS TRICHLORIDE	SODIUM CHLORATE
PHOSPHORUS PENTACHLORIDE	POTASSIUM CHLORATE
PHOSPHORUS PENTASULFIDE	POTASSIUM PERCHLORATE
PHOSPHORUS SESQUISULPHIDE	HYPOPHOSPHITES
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icals to large markets in the northeast, by Celanese Corporation of America. In 1948 the company pioneered in the water transportation of bulk formaldehyde from Corpus Christi to New Haven, Conn.

Portable Sterile Filler

A new portable sterile filling machine designed to deliver accurately measured quantities of liquids into vials or ampules on a production basis has been developed by S. Rosen & Associates, 5005 Queensbury Ave., Baltimore, Md.

The new filler, called the Filametic Portable Filling Machine, should be of interest to manufacturers of fine drugs, etc.

$CaCl_2$ Packaged in Polyethylene-Lined Bag

A new type, polyethylene-lined paper bag for flake calcium chloride packaging has recently been adopted by the Solvay Sales Division, Allied Chemical and Dye Corp. This new bag will be used for both the 100 and 25 lb. packages.

This new package was adopted after extensive field tests and is reported to be stronger, possess a higher resistance to moisture and have a longer storage life than the conventional asphalt lined bag previously used. In addition, the polyethylene lining is not affected by extremes of temperature; it will not crack in cold weather or melt in hot weather.

Additional Amendments To ICC Regulations

In addition to the changes listed in the Packaging & Shipping section of the March issue, the Interstate Commerce Commission Rules and Regulations were amended on Jan. 23, 1950, as follows:

A new amendment to the Interstate Commerce Commission Regulations, not heretofore in the regulations, is ICC Specification 6K, steel barrel. This covers a container with marked capacity not over 55 gallons, authorized gross weight not over 480 pounds, and constructed both body and head sheets of 18-gauge material.

The purpose of this new specification is to provide an additional returnable container for carload and truckload shipments only.

A new specification, MC 330, Steel Cargo Tank, has been added to the regulations.

The purpose of this new specification is to provide a bulk container for the transportation of anhydrous ammonia, liquefied petroleum gas and sulphur dioxide.

There were many other amendments in the latest revision of the Regulations. Since these applied to explosives, no attempt was made to cover them in this brief summary.

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Your product may be one of the thousands of items for which a fibre drum is just about the perfect package. And there are some thumping good reasons why a Continental fibre drum is the best drum you can use.

Continental fibre drums can't be beat for rugged durability. They give extra protection to both expensive and dangerous articles for shipment either in this country or abroad. The closures are tight and strong —but easy to open and close.

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Continental fibre drums can't be beat for appearance. They are neat and trim, tailored to your product, and feature quality printing or spray painting. Each Continental drum is a style leader in its field.

Most important, Continental can't be beat for service. There are four strategically located Continental fibre drum plants ready to give you fast, economical and dependable service. Continental packaging engineers are always ready to give you sound advice on packaging problems. Backing up these engineers is a modern laboratory staffed with qualified research and development people.

Continental is big enough and flexible enough to handle any situation. Again and again Continental customers say, "You make us feel as though your fibre drum department is part of our own company." We'd appreciate an opportunity to show you how much real help and service we can deliver.

These drums can help you boom sales

1. The famous Continental LEVERPAK drum with its unique lever-locking device gives maximum protection under hard usage. 12- to 75-gallon sizes.
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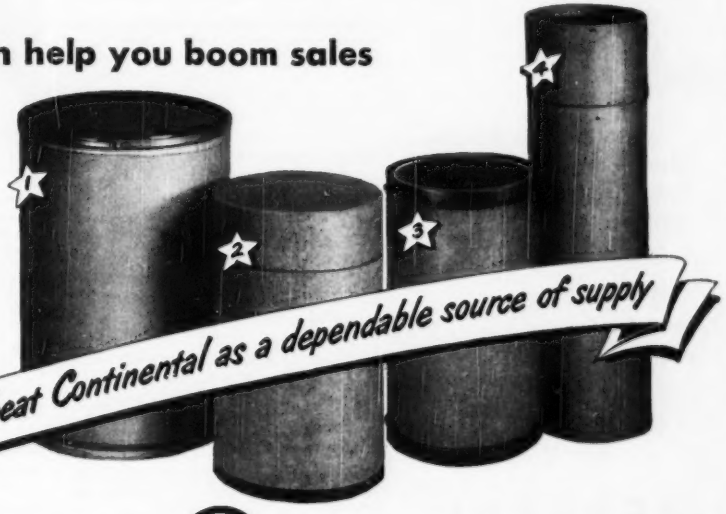
3. Continental STAPAK drum. Has fibre body with metal top and bottom. Supplied in 2- to 32-gallon sizes.
4. Continental UPAK drum. Custom-made for the shipment of rolled materials.



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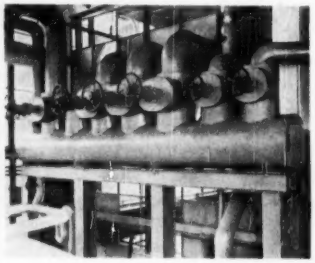
PLANT OPERATIONS NOTEBOOK

Lower Heat Losses

Operating costs cut by mineral wool insulation of flanges, valves, and fittings.

Pipe flanges, valves, and fittings are perhaps the greatest Btu wasters in a plant because their odd shape makes them difficult to insulate.

However, modern techniques, as evidenced by the mineral wool insulated valves at the Salisbury Axle plant in Fort Wayne, Indiana, now make it a relatively simple matter to effectively insulate irregular surfaces.



Valves insulated with mineral wool can reduce heat loss 80-90% at 350° F.

Recommended procedure for effectively insulating these surfaces with mineral wool, are as follows:

1. Cut and notch blocks of mineral wool to conform to the given contour.
2. Wire the blocks in place with 16-gage galvanized wires or wire bands.
3. Apply a ¼ in. coat of mineral wool cement, troweling it well into cracks between adjacent blocks.
4. Apply finishing: canvas jacket indoors; sheet-metal jacket, roofing-felt, or asphaltic finish outdoors.
5. For small fittings, insulating cement can be built up in separate coats no greater than ¾ in. thick, to a thickness equal to that on adjacent piping.

Safer Welding

New mask eliminates hazards from toxic vapors produced in welding operations.

Where toxic materials must be stored or handled, even after all explosion and fire hazards have been eliminated, the element of toxicity remains or can be created by the heat of welding.

A device has now been perfected that enables a welder to work conveniently and safely in atmosphere containing toxic vapors, dusts and fumes by Ethyl Corp., in collaboration with several oil companies and Mine Safety Appliances Co., Pittsburgh, who developed the equipment.

Protection against ultra-violet and infra-red radiation, impact and pitting, and inhalation of toxic fumes are combined in one unit. The facepiece assembly consists of an air-tight rubber mask and chrome leather hood with flexible breathing tube connections. The most distinctive feature of the new device is the aluminum frame and flip-front assembly for holding the lenses. Three lenses are used—one is a permanent safety lens sealed in the assembly; the other two are removable welding and pitting lenses inserted in the flip-front. Different shades of filtering lenses can be used depending on the type of welding to be done. The flip-front enables the wearer to examine the work without interfering with the respiratory protection.

The facepiece is adaptable to three different types of masks: combination

New equipment provides complete eye, face and respiratory protection for welders repairing tanks or pipes containing toxic vapors, dusts or fumes. The facepiece is adaptable to three different masks.

fresh air hose, airline repirator and all-service canister. The latter two are for use only outside of tanks.

Development of the new facepiece was in answer to the problems encountered by the petroleum industry in the storage and handling of leaded gasoline, which was interested in providing means to repair gasoline tanks safely without the necessity of costly tank cleaning.

Numerous other applications have been found for the facepiece. Some of these include the repair of large exhaust lines carrying carbon monoxide, repair of refrigeration systems, and maintenance of pressure vessels in which the heat of welding might liberate toxic vapors.

• A new Quik-Label **pipe marker** for identifying small diameter pipe & conduit is being produced by the W. H. Brady Co., Dept. 23, 815 N. 3rd St., Milwaukee, Wis. This newest, self-

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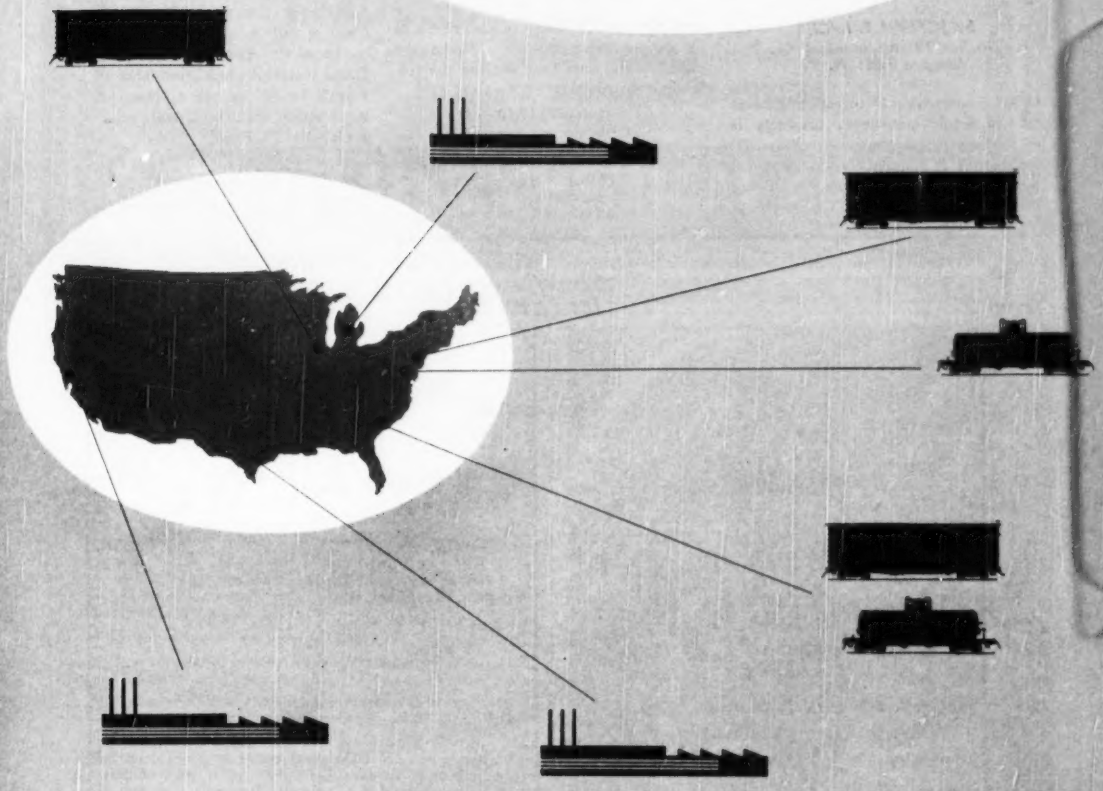
3. Caustic Soda Solid, Flake and Ground Flake terminal distributing facilities—Chicago, Ill., Charleston, S. C., and Port Newark, N. J.



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sticking marker was developed to wrap around small pipe & conduit with diameters ranging from ¼" to 2".

A typical marker is 2¼" x 9" long. The name of the material is printed eighteen times on a background color established by the American Standards Assoc. (Standard #A13). The entire 9" long label need not be wrapped around a single pipe. It may be cut right on the card into shorter lengths.

• Saf-T-Vox, produced by American Allsafe Co., 1245 Niagara St., Buffalo 13, N.Y., is a small and compact unit for recording and reproducing of safety messages.

It enables the safety man to deliver his verbal warning at the danger point BEFORE the danger moment, whenever and wherever he desires.

A magnetic tape on which messages are recorded, an amplifier, a loudspeaker and a starting trigger are used. No resetting or rewinding is necessary. It is always ready to speak when its starter is tripped, by interception of electric beam or otherwise.

NOMOGRAPH-OF-THE-MONTH

Edited by DALE S. DAVIS

SPECIFIC HEAT OF LIQUID OILS

by ***JOSEPH I. LACEY***
Hooker Electrochemical Co.
Niagara Falls, N. Y.

THE estimation of the specific heats of liquid petroleum products is of interest to engineers, chemists and designers. The subject has been investigated by many people, including Fortsch and Whitman (1), who measured the specific heats of different oils at various temperatures. From the experimental data they derived the following equation:

$$C = \frac{(t + 670)\,(2.10 - \delta)}{2030}$$

where C = specific heat, B.t.u./(lb.) (° F.)
t = temperature, ° F.
δ = specific gravity at 60° F.

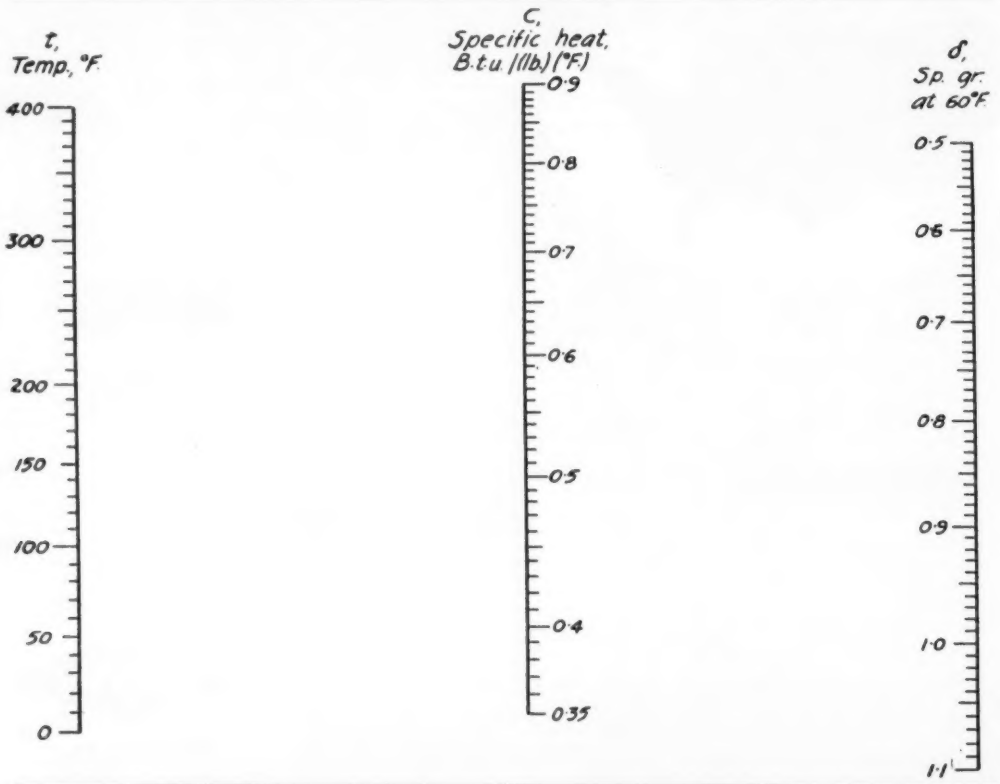
The authors claim that this equation is good for liquid oils up to their boiling points and that it is fair above the boiling point under sufficient pressure to prevent vaporization if the temperature is at least 100° F. below the critical value. The range of specific gravities investigated was from 0.75 to 1.00. Under these conditions the deviation from the experimental value is less than 2.5 per cent.

The equation, which is of a standard form, can be represented by the accompanying logarithmic multiplication chart. To use this chart, draw a straight line from the value of the specific gravity to the desired temperature and read the specific heat at the intersection with the specific heat scale.

For example, assume that a certain feed stock has a specific gravity of 0.800 at 60° F. and that it is desired to know its specific heat at 200° F. Draw a straight line from 0.800 on the δ scale to 200 on the t scale. At its intersection with the C scale read 0.557 B.t.u./(lb.) (° F.).

Literature Cited

(1) Fortsch, A. R. and Whitman, W. G., Ind. Eng. Chem., *18*, 795 (1926).



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- for any method of application — laminating, brush, roller-coating or spraying in any form — slabs, drums or solution

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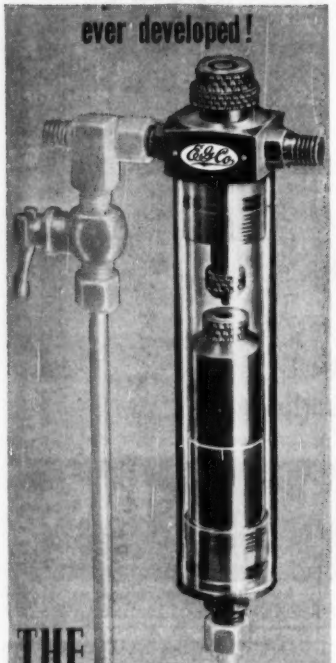

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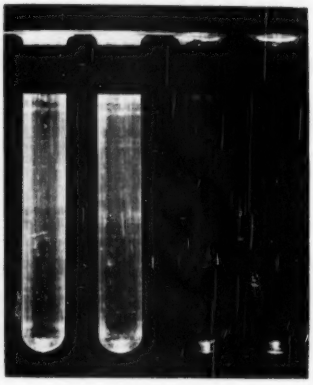
LABORATORY NOTEBOOK

Washing Glassware

New inhibited detergents for washing laboratory glassware now available.

The four test tubes shown below were immersed for eighteen hours at 210°F in 0.30% solutions of glass washing detergents. The two badly etched tubes at the left were exposed to a standard



detergent solution; the new-looking tubes at the right were immersed in Wyandotte Dural H—a new inhibited detergent for washing laboratory glassware by hand.

This newest cleaning product of Wyandotte Chemicals Corp., Wyandotte, Mich. washes even in hard water, produces little or no etching. A companion product, Wyandotte Dural M, has been originated for the machine washing of laboratory glassware.

Polarograph

New Polarograph can be operated manually.

The new Polarograph, the Model III, made by E. H. Sargent & Co., 4647 W. Foster Ave., Chicago, Ill. incorporates the same design and construction used in the recording Models XII and XXI.

While the Model III may be used in any phase of Polarography, it is recommended for:

(1) In routine analyses where only one substance is determined and where the step shape approximates a pure form, characteristic of reversible reactions involving simple ions in fairly substantial concentrations.

(2) In laboratories where a recording instrument is now in use for several determinations, a Model III may be used for each determination, thus releasing the recording Polarograph for research purposes and for establishing the conditions of the routine analyses.

(3) In amperometric titrations.

(4) For instructional purposes in educational institutions where the 315 mm. long, readily visible scale and the simplicity of design make the Model III Polarograph ideal for demonstrations.

• A new helper for either production run or laboratory sampling is the stainless steel **pressure sample container** produced by Hoke, Inc., Englewood, N. J.

These ICC approved containers are

available in two standard service pressure ranges of 400 psi and 1800 psi and may be obtained for either single or double valving. 18-8 Stainless Steel is used, although on special order, they may be made of other metals, ferrous or nonferrous.

• The National Bureau of Standards and the American Petroleum Institute, through a cooperative program begun in 1943, have prepared a total of 178 compounds now available as NBS standard samples of hydrocarbons for calibrating analytical instruments and apparatus in the research, development, and analytical laboratories of the petroleum, rubber, chemical, and allied industries. The most recent additions to the series follow.

NBS sample number[1]	*Compound Name*	*Amount of impurity*[2]	*Volume per unit*[3]	*Price per unit*
		mole percent	*ml (liquid)*	
580-5S	n-Tetradecane	0.07±0.06	5	$35.00
581-5S	n-Pentadecane	0.07±0.05	5	35.00
582-5S	4,4-Dimethyl-cis-2-pentene	0.21±0.11	5	35.00
583-5S	Cyclopentylcyclopentane	0.05±0.03	5	35.00
578-5S	1-Methylnaphthalene	0.08±0.03	5	35.00
584-5S	1-Dodecene	0.13±0.07	5	35.00
585-5S	1,2,4,5-Tetramethylbenzene	0.14±0.04	5	35.00
586-5S	n-Decylbenzene	0.20±0.16	5	35.00
587-5S	1,2,3,4-Tetrahydronaphthalene	0.14±0.06	5	35.00

[1] The designation "-5S" following the sample number indicates a sample of 5 ml sealed "in vacuum" in a special Pyrex glass ampoule with internal "break-off" tip.

[2] The purity has been evaluated from measurements of freezing points, as described in J. Research NBS 35, 555 (1945) RP1676 unless otherwise indicated.

[3] Tolerance approximately ± 10 percent.

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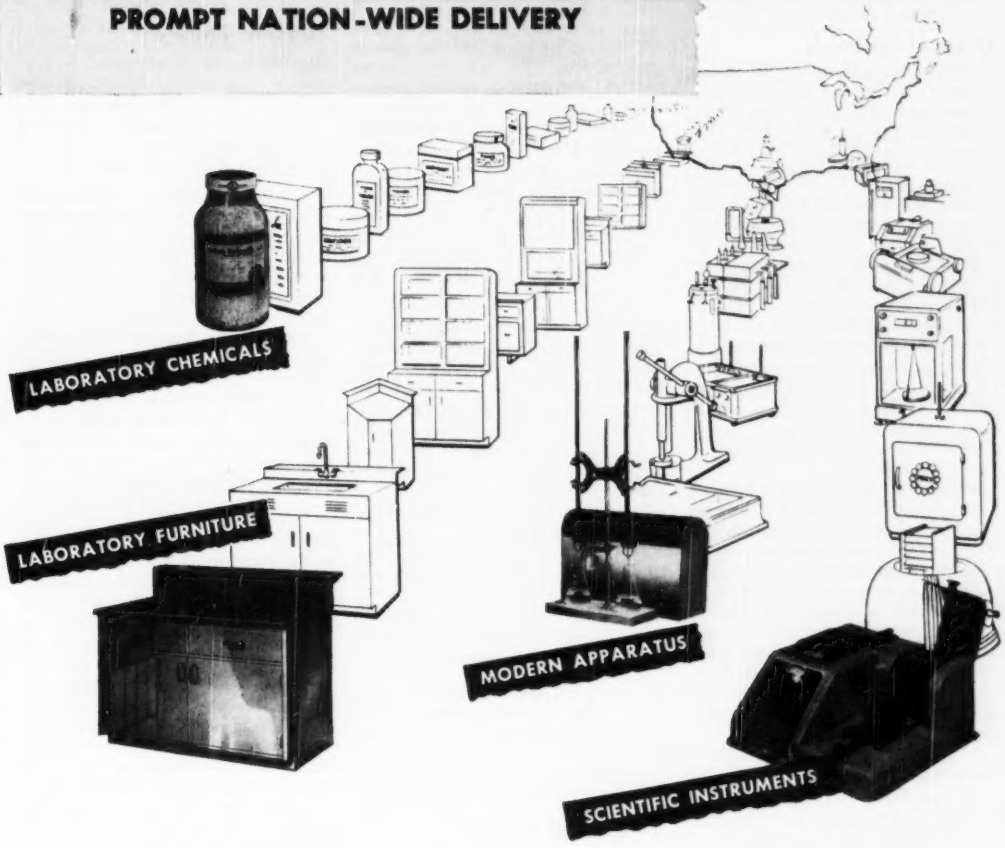

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INDUSTRY'S BOOKSHELF

Organic Synthesis

SYNTHETIC METHODS OF ORGANIC CHEMISTRY, VOL. II, *by W. Theilheimer.* Interscience Publishers, New York, 1949; 324+xii pp., $7.50.

TRANSLATION of the author's *Synthetische Methoden der Organischen Chemie* was considered valuable enough to merit the support of several industrial firms.

These volumes are a continuing record of new and improved synthetic methods and older methods, references to which are scattered thoughout the literature.

Reactions are arranged according to a logical but arbitrary system depending on which particular bonds are broken and formed. It is well that a comprehensive cumulative subject index is available to those who are too bemused to master the system.

Abstracts are limited to the information needed for an appraisal of the applicability of a desired synthesis, including number and nature of reaction steps, yield, and literature references.

The work has been described as a thesaurus—and accurately, for the researcher is aided in his choice of the most apt synthesis just as Roget helps a writer find the most applicable word. The time saved in literature searches may well repay the supporters of this worthy project.

Luminescence

AN INTRODUCTION TO LUMINESCENCE OF SOLIDS, *by Humboldt W. Leverenz.* John Wiley & Sons, New York, 1950; 569+xv pp., $12.

DESIGNED as an orderly introduction to a growing field which has had its concomitant difficulties with conflicting terminology and inaccurate data, this book introduces a consistent system of terminology, notations, and definitions. Over a thousand references, moreover, provide an adequate guide to the earlier literature.

Instead of taking up phosphors one by one and listing their known characteristics, the author describes them generally in terms of preparations, compositions, structures, and physical characteristics, using individual phosphors to illustrate each feature.

The first five chapters cover the essential fundamental information—chemistry, crystallography, and physics—of luminescent solids. The remaining two give practical information on the properties and limitations of the more useful phosphors, followed by brief descriptions of suitable application procedures. Among uses discussed are cathode-ray tubes, electron microscopes, nuclear particle counters, icaroscopes, and television.

An extensive appendix brings together much useful data.

Colorimetric Analysis

COLORIMETRIC METHODS OF ANALYSIS (Vol. II, Inorganic), *by Foster D. Snell and Cornelia T. Snell.* D. Van Nostrand, New York, 1949; x + 950 pp., $12.

IN THIS comprehensive text on inorganic colorimetric analysis the authors have attempted to avoid being too critical—and therefore too personalized and noninclusive—on one hand, and too noncritical on the other hand. Their middle-of-the-road result is inclusive, but unimportant and unestablished methods are mentioned only briefly.

Some turbidimetric and nephelometric methods are also included.

The various ions and groups are taken up separately in 68 chapters, and extensive author and subject indexes are included. The entire text is liberally footnoted with references to the original literature.

The objective of the work is to provide the analyst with methods applicable with more or less standard colorimetric instruments. It is designed to aid him in the selection of methods and to obviate the necessity of his consulting a complete library.

Analysis of Poisons

THE ANALYTICAL CHEMISTRY OF INDUSTRIAL POISONS, HAZARDS, AND SOLVENTS, *by Morris B. Jacobs.* Second ed., 788+xviii pp., $12. Interscience Publishers, New York, 1949.

IN THE eight years since the first edition of Prof. Jacob's book was published, much progress has been made in the field of industrial hygiene. The new revised and enlarged edition incorporates much of that progress in so far as it relates to analytical chemistry.

Early chapters define the province of industrial hygiene and discuss in general terms the techniques employed in detection and analysis. Later chapters discuss in detail the detection, determination and toxicity of individual industrial poisons. An appendix gives tables of inflammability, explosibility, and probable safe concentration limits of various materials.

The author has attempted to be—and has succeeded in being—comprehensive. His book is useful for teaching, but its chief utility is as a laboratory work-book in industry, insurance, education, governmental regulation, and medicine among chemists, toxicologists, and physicians.

Organic Theory

ELECTRONIC INTERPRETATIONS OF ORGANIC CHEMISTRY, *by A. Edward Remick.* John Wiley and Sons, Inc., 2nd ed. 1949, 600 pp., $6.00. Reviewed by Herbert C. Brown, Professor of Chemistry, Purdue University.

ORGANIC chemistry is in the midst of a major revolution. For some ninety years the structural theory, with minor changes, served as the unifying principle of the science. It facilitated the systemization of the myriads of organic compounds and their reactions. With the mounting accumulation of information, the structural theory alone can no longer serve as the major reliance of the organic chemist. With hundreds, even thousands, of facts known about the reactions of relatively simple molecules, the structural theory is of relatively little assistance in systemizing this mass of information so that it can be recalled and utilized.

In answer to this urgent need for systemizing information relating to chemical reactions, the field of reaction mechanisms has made tremendous progress in the last few years. Known information can be correlated and understood in terms of relatively simple principles. For the first time in organic chemistry, the effects of changes in structure and reaction conditions can be predicted with considerable confidence. As a result organic chemistry, from its past status as an art, is on the way toward becoming a science. It may be predicted that within a decade a full understanding of the principles of reaction mechanisms will be as essential to the research chemist as a knowledge of the structural theory has been to the chemist of the past. A tremendous task lies ahead in acquainting and training organic chemists in the use of this new tool.

Professor Remick's book is a major contribution toward the solution of this problem. It is a highly readable exposition of the principles of the newer organic chemistry. Any chemist who reads the book carefully should become sufficiently facile in the basic principles of reaction mechanisms to utilize them in guiding his own research. In the reviewer's opinion any chemist who devotes himself to the mastery of this new field will probably place the time thus spent among his best investments.

The second edition shows considerable changes over the first edition which appeared in 1943. Much new material has been added, including a new chapter on steric effects and increased emphasis on

reaction mechanisms. Numerous references to very recent journals show a commendable effort to include very recent developments in the revision.

Two minor criticisms may be mentioned. Professor Remick has placed major emphasis on the contributions and terminology of the English school, led by Hughes and Ingold. Major contributions have been made in this country, particularly in the field of the reactions of aliphatic hydrocarbons and in polymerization. These receive relatively little attention. Again, Professor Remick presents much of the material in the form of summaries of individual papers or of quotations from these papers. A more complete synthesis and interpretation of the separate papers would have markedly improved the value of the book.

These are relatively minor criticisms. "Electronic Interpretations of Organic Chemistry" is a highly readable treatment of the physical approach to organic chemistry and should be a valuable and useful addition to the library of every chemist.

Wines and Liquors

CHEMISTRY AND TECHNOLOGY OF WINES AND LIQUORS, *by Karl M. Herstein and Morris B. Jacobs.* (Second Ed.), D. Van Nostrand Co., New York, 436 pp. Price $6.50. Reviewed by George I. de Becze, Schenley Distilleries, Inc.

THE FIRST edition, after the repeal of prohibition, contained badly needed information. This second edition of the only book in English which covers the broad subject in one volume brings that information up to date with 78 additional pages. Terms and topics, both common and rare, essential to the general management, purchasing, sales, legal, processing, and control branches of the trade are discussed in a well-organized text. For the student interested in wine and liquor technology, the book provides broad initial knowledge. It is not a manufacturers' text book with all details needed by processing chemists and engineers. Such a book, not yet written, would fill several volumes.

The sixteen chapters form three groups: the first 111 pages offer general information concerning carbohydrates, enzymes, fermentation, microorganisms, raw materials, yeast, malt, and distillation; the next 140 pages present definitions, composition, and production of all domestic and foreign alcoholic beverages except beers and ales; and the last 180 pages, comprising the interpretation of chemical analyses and analytical methods (taken chiefly from the A.O.A.C.), accommodates the control chemists. The description of manufacturing methods, including many recent developments, is brief in parts and lengthy in other places, i.e., fermentation and distillation of American whiskies occupies less than two pages, while over ten pages are devoted to artificial and rapid aging.

Sixty charts offer data on the composition of barley, rye, corn, oats, wheat, grapes, wine musts, whiskies, wines, rums, cordials, brandies, gins, and vodka. Many equivalents used in chemical analyses are also shown.

The flow chart for whiskey, spirits, and gin production and diagrams on mashing, conversion, yeasting, fermentation, and distillation along with forty other figures are illuminating. The easily legible print with heavier headings and italics, and the clear charts on good quality paper will please the reader. The black bound book makes an attractive addition for libraries.

Detergency

FUNDAMENTALS OF DETERGENCY, *by William W. Niven,* Jr., Reinhold Publishing Corp., New York; 1950; 256 pp., $5.50.

THIS WORK, of interest to anyone in the food products industry, soap, textile, rubber, drug, ink, printing, laundering and paint industries, fills the need for a comprehensive reference in the detergents field. Neither too generalized nor too specialized, it discusses the theory and applications of detergents for those who have reasonable technical backgrounds.

The first half of the book treats fundamental considerations of the detergent process; nature and properties of detergent solutions and of builders; and effects of builders on solutions. In the second half, laundering is chosen as the example of practical application of detergent principles.

A brief appendix follows, discussing the theory of Cassie and Palmer on the effect of electrolytes on surface activity.

Other Publications

METAL CLEANING Bibliographical Abstracts, by Jay C. Harris, 68 pp., liberally indexed by subject, author, and patent nos. A.S.T.M., 1916 Race St., Phila. 3, Pa., $2.75.

CATHODIC PROTECTION of galvanized hot-water storage tanks, 16 pp., 25¢, Cleveland Heater Co., 2310 Superior Ave., Cleveland 14, O.

VEGETABLE GUMS AND RESINS, by F. N. Howes. Commercial products with special reference to recent developments, 240 pp., $5.00. Chronica Botanica Co., P. O. Box 151, Waltham 54, Mass.

PHYSICAL AND CHEMICAL Examination of Paints, Varnishes, Lacquers and Colors, by Gardner and Sward, has been issued in an 11th edition—the last in its present form. 722 pp., $20.00. Gardner Laboratory, 4723 Elm St., Bethesda, Md.

RUBBER RED BOOK, a compendium and directory for the rubber industry and its suppliers. Latest biennial issue contains 923 pp., $5.00. The Rubber Age, 250 W. 57th St., New York 19, N. Y.

THE GIVAUDAN INDEX assembles for the first time specifications of synthetic organic chemicals and essential oil isolates used in perfumery. 378 pp., $5.00. Givaudan-Delawanna, Inc., 330 W. 42nd St., New York 18, N. Y.

PAPERS PRESENTED at the First Short Course on Industrial Packaging and Materials Handling, 248 pp., $1.00, University of Illinois, Urbana, Ill.

IRON BEARING DEPOSITS in Washington, Oregon, and Idaho, a report designed to furnish factual information on raw materials for existing and prospective industries in the Columbia River Basin. 89 pp., $2.50. Raw Materials Survey, 701 Woodlark Bldg., Portland 5, Ore.

FOR YOUR INFORMATION

The following Technical documents in the field of Petroleum-Chemistry (Translations from GERMAN and RUSSIAN into ENGLISH) are being processed at the present writing.

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b) Eighteen new translations of German Patent Applications on various subjects pertaining to the Petroleum-Chemistry field (PC's 112 to 129 inclusive).

c) The new GERMAN-ENGLISH TECHNICAL DICTIONARY based on data compiled by the U.S. Air Force. Vol. I (A to K) now off press. — Vol. II (L to Z) ready for distribution in June 1950.

d) Do not miss "ACETYLENE CHEMISTRY" by Dr. Julius Walter Reppe.

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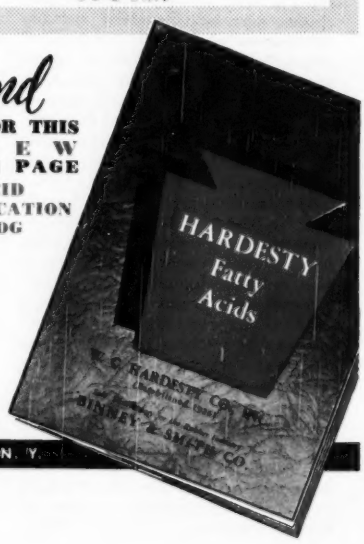

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Soaps C164

23-p. booklet describes complete line of soaps, synthetic detergents, cleansers and washing powders, and sizes and units available. Colgate-Palmolive-Pete Co.

Nutritional Research Products C165

33-p. booklet describes briefly composition and prices of special products for nutritional research, such as test diet ingredients, vitamins, amino acids, carotene concentrates, etc. General Biochemicals, Inc.

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Technical bulletin describes triethyl orthoformate. Kay-Fries Chemicals, Inc.

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Technical bulletin No. 29 describes Emsol H-77, an emulsifier for D. D. T., Toxaphene, Chlordane, B. H. C., Methoxychlor, Aldrin, Dieldrin, 2,4-d or 2,4,5-t esters and certain combinations of these toxicants. The Emulsol Corp.

Water Conditioner C171

4-p. bulletin describes characteristics and advantages of PN-700, a chemical conditioner that makes water "wetter". Service Industries.

Rancidity Inhibitor C172

6-p. bulletin, No.2, discusses problems of rancidity and describes how Tenox II may be used to combat the development of rancidity and prolong shelf life, by addition of small amounts to frying oils. Also available Bulletin No. 4 which describes how salted foods which contain fats and oils can be protected from oxidative rancidity by addition of Tenox II to the salt. Tennessee Eastman Corp.

Beta-Substituted Propionitriles C173

17-p. booklet describes chemical and physical properties, potential applications and toxicity of beta-substituted propionitriles. American Cyanamid Co.

Organic Laboratory Chemicals C174

22-p. booklet lists prices of chemicals available from Smith-New York Co., Inc.

Furfural C175

48-p. booklet discusses properties of furfural, furfural polymerization products, and some miscellaneous studies. Bulletin No. 169, Iowa Engineering Experiment Station.

Vat Dyeing C176

Paper on vat dyeing by O. W. Clark and H. R. McCleary discusses the exhaust behavior of vat dyes on cotton cloth. Data on the exhaust behavior of several vat dyes from the leuco bath are presented and results of laboratoty continuous reduced dyeings are examined in relation to these data. Calco Technical Bulletin No. 810, Calco Chemical Division, American Cyanamid Co.

Glycerine for Alkyd Resins and Ester Gums C177

12-p. booklet outlines reasons for use of glycerine in alkyd resins and ester gums and describes physical properties, origin, development, and chemistry. Included are tables of specific gravity, viscosity, freezing point, etc., of aqueous glycerine solutions at various concentrations. Glycerine Information Service.

Allyl Chloride C178*

Book discusses reactions and characteristics of allyl chloride. Includes comprehensive review of available literature and data compiled by Shell Development research staff. Shell Chemical Corp.

Aluminum Paint C179*

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Cyanidation C180

40-p. booklet describes fundamentals of cyanidation, and zinc, copper and iron in cyanidation. Mineral Dressing Notes No. 7, American Cyanamid Co.

Alums C181

Three technical data sheets describe qualities of ammonia alum, potash alum and aluminum sulfate (iron free). C. Tennant, Sons & Co.

Toxaphene Insecticides C182

7-p. booklet contains current state and federal recommendations on how to use and apply toxaphene agricultural insecticides. Hercules Powder Co.

Resin Cement C183

4-p. bulletin describes physical and chemical properties, typical uses and application instructions for Permanite, acid-,solvent-,alkali-proof resin cement. Bull. No. 4, Maurice A. Knight Co.

Plasticizer C184

4-p. bulletin describes properties, pharmacology, and applications of Santicizer 141, a non-toxic, monomeric plasticizer for use in plastic products which may come in contact with meat or meat products. Bulletin No. O-D-114, Monsanto Chemical Co.

Resin Glues C185

Booklet discusses planning of bulk handling systems for resin glues. Monsanto Chemical Co.

Sludge Remover C186

Booklet discusses Ameroid and its use in fuel oil treatment and sludge removal. Correction of unsatisfactory conditions in the storage, handling, pumping, heating and burning of industrial fuel oil. Power Chemicals Div., E. F. Drew & Co.

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Insulated Piping K298

Bulletin No. 480-4 describes the manufacture, construction and installation of various types of insulated piping. Bulletin No. 408-5 contains technical data and specifications on all phases of insulated piping, its structure and properties. The Ric-Wil Co.

Blower K299

4-p. bulletin lists various capacities possible in Standardaire blower when direct connected to standard speed motors. Publication No. 6, The Standard Stoker Co., Inc.

Tritilog K300

4-p. bulletin describes performance and operation of Tritolog for the continuous recording of trace quantities of sulfur compounds. Diagram included. Bulletin 1810A, Consolidated Engineering Corp.

Mixer K301

6-p. folder describes features, specifications, and operation of counter-rotating mixer. Brookfield Engineering Laboratories, Inc.

Motors K302

2-p. bulletin describes construction and specifications of explosion-proof motors from ½ to 125 hp. Bulletin No. C-130, Reliance Electric & Engineering Co.

Generator K303

4-p. bulletin describes advantages, capacities and dimensions of gas fired, automatic generator. York-Shipley, Inc.

Generator K304

4-p. bulletin describes features, capacities, and dimensions of oil fired, automatic generator. York-Shipley, Inc.

Ion Exchangers K305

12-p. bulletin describes selection, applications and installations of ion exchangers. Bulletin No. 2508, The Permutit Co.

Fire Brick K306

6-p. bulletin describes features of fire brick and properties and uses of specialties products. Laclede-Christy Co.

Water Jet Eductors K307

36-p. bulletin describes application, construction and operation of water jet eductors for lifting, pumping, mixing and agitating of liquids. Diagrams included. Bulletin 2-M, Schutte and Koerting Co.

Rotameters K308

Bulletin No. 18-RB describes operation, selection, and capacities of complete line of rotameters. Schutte and Koerting Co.

Mixers K309

4-p. bulletin describes construction and advantages of 2 dispersion-type mixers. Patterson Foundry and Machine Co.

Mixers K310

8-p. catalog describes and gives operating details for Kneadermaster mixers from ¼ to 2,000 gallon capacities. Patterson Foundry and Machine Co.

Pumps K311

23-p. bulletin describes applications and construction and gives operating data on centrifugal and piston pumps. Diagrams included. Scranton Pump. Div., Condenser Service and Engineering Co.

Condensers K312

28-p. bulletin describes design, construction and use of condensers. Diagrams included. Condenser Service and Engineering Co.

Water Stills K313

6-p. bulletin describes advantages of water stills. Specifications and prices included. Bulletin No. 910, Precision Scientific Co.

Air Diffusers K314*

68-p. selection manual describes how to calculate required air volume, locate diffusers and determine number of units required. Selection chart, application data, and specifications and dimensions of various types of diffusers included. Anemostat Corp. of America.

Valves K315

8-p. bulletin describes features and dimensions and diagrams conservation vent valves and units. The Vapor Recovery Systems Co.

Welding K316

32-p. catalog describes characteristics and application of All-State rods and fluxes. All-State Welding Alloys Co., Inc.

Radioisotopes K317

26-p. booklet contains a general survey of the tracer and control work being done with radioisotopes today. The Kellex Corp.

Steel and Alloy Plate Fabrication K318

15-p. bulletin illustrates fabrication of steel and alloy tanks and pressure vessels. Corrosion data charts included. Catalog No. 150, Nooter Corp.

Hot Water Heaters and Heat Exchangers K319

36-p. booklet gives complete specifications and capacities for hot water heaters and heat exchangers. Patterson-Kelley Co.

Blender K320

4-p. bulletin describes features, capacities and dimensions of twin shell blender for dry solids. Patterson-Kelley Co.

Computer K321

Bulletin No. 278 describes advantages and use of electrical computer which solves simultaneous linear equations of the type encountered in infrared and mass spectrometry. Special Products Div., Phillips Petroleum Co.

Liquid Shock Absorbers K322

2-p. bulletin describes features and uses for liquid shock absorbers. K-S Products Corp.

Laboratory Apparatus K323

64-p. catalog lists specifications and prices for laboratory apparatus, for chemistry, physics, biology and general science. Standard Science Supply Co.

Valves K324

24-p. bulletin describes operation, construction, and dimensions of reducing valves. Bulletin No. 148, Klipfel Manufacturing Co.

Dial Indicators K325

4-p. bulletin describes construction and features of concentric dial indicator. Taylor Instrument Cos.

Motor K326

4-p. bulletin describes application, design and advantages of ¼—2 hp. motor. Diagrams included. Reliance Electric and Engineering Co.

Impregnation Unit K327

Bulletin describes unit for prevention and correction of porosity in metal castings by batch immersion methods. Western Sealant, Inc.

Blast Furnace Repair K328

4-p. bulletin describes how threadless coupling cuts blast furnace repair 65%. By E. R. Norris. Dresser Manufacturing Div., Dresser Industries, Inc.

Controller K329

Bulletin describes construction and operation of explosion-proof, float-operated electric controller for water tanks and other liquid storage systems. McDonnell and Miller, Inc.

Hose K330

Bulletin covers selection, installation and servicing of oil and gasoline hose. Data on various types of hose included. New York Belting and Packing Co.

Insulation K331

20-p. bulletin describes design and application of Rubatex R-103-S insulation hardboard for low-temperature insulation purposes. Rubatex Div., Great American Industries, Inc.

Heat Exchanger and Condenser Tubes K332

Bulletin TB-329 describes specifications and selection of heat transfer units. The Babcock and Wilcox Tube Co.

Steel Shafts K333

20-p. bulletin contains data for determining stresses, torques, bending moments and deflections in steel shafts. Bulletin G-7, De Laval Steam Turbine Co.

Electrostatic Precipitation K334

16-p. bulletin explains how electrostatic precipitation works, gives case histories of typical installations and describes various methods of electrostatic precipitation and equipment applicable to each method. Bulletin GEA-5212, General Electric Co.

Demineralizers K335

20-p. bulletin describes difference between demineralized and distilled water and discusses advantage and operation of demineralizing equipment. Catalog No. 123, Barnstead Still and Sterilizer Co.

Welding K336

20-p. booklet describes advantages and applications of flash butt welding. The American Welding and Manufacturing Co.

Magnetic Separators K337

4-p. bulletin describes advantages and operation of Triple-Air-Gap and Single-Air-Gap separators for chutes, magnetic grates and portable separators. The Bauer Bros. Co.

Speed Reducer K338

16-p. bulletin describes construction, specifications and selection of torque-arm speed reducers. Bulletin No. A-470, Dodge Manufacturing Co.

Instrument and Control Panels K339

8-p. booklet explains construction, application and features of instrument and control panels. The Hays Corp.

Dust Control K340

4-p. bulletin describes advantages and application of Aquadyne for dust control in industrial plants. Aquadyne Corp.

Centrifugal Dryer K341

4-p. bulletin describes features, installation and capacities of continuous centrifugal fine coal dryer. Bulletin No. 1149, McNally Pittsburg Manufacturing Corp.

Strip Chart Recorder K342

2-p. bulletin describes design and operation of air-operated strip chart recorder. Supplement to Bulletin C2, Wheelco Instrument Co.

Welding Alloy K343

Bulletin describes features and includes technical data on EutecRod 190, a thin-flowing welding alloy for aluminum. Form Eu-31, Eutectic Welding Alloys Corp.

Level Indicator K344

Bulletin diagrams and gives dimnesions for level indicators. Panalarm Products Div., Panellit, Inc.

Corrosion Resisting Linings K345

Bulletins C-6A and C-7 describe advantages and application of corrosion resisting linings for wood and steel tanks. 2 pp. each, Carboline Co.

Storage Batteries K346

40-p. bulletin discusses theory of the lead-acid battery, operation, maintenance and repairs and

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includes technical data. Gould Storage Battery Corp.

Hammer Mill **K347**

6-p. bulletin describes features and construction of hammer mill for heavy duty. Bulletin No. 1, Sprout-Waldron and Co., Inc.

Fuel Costs **K348**

1-p. bulletin describes services of industrial coal counselor for reducing coal costs. Roy Emmert.

Rubber-Lined Pipe **K349**

4-p. bulletin describes advantages, applications and specifications of rubber lined pipe. Bulletin No. 6907, Raybestos-Manhattan, Inc.

Laboratory Equipment **K350**

Bulletin 50-G lists prices of various pieces of laboratory equipment. American Indicator-Paper Co.

Polarographic Analysis **K351**

104-p. bibliography contains 2208 references to scientific papers on polarographic analysis. Leeds & Northrup Co.

Fractionating Columns **K352**

4-p. folder lists prices of glass fractionating columns and accessories. From 4G250FE4, Glass Engineering Laboratories.

Valves **K353***

10-p. bulletin contains test data, charts, and capacity tables for various models of safety valves. Bulletin No. 250, Marine and Industrial Products Co.

Photoelectric Control **K354**

Bulletin PA478 describes general purpose photoelectric control. Photoswitch, Inc.

Tubing **K355**

Bulletin TB-324 describes advantages and applications of mechanical tubing. The Babcock and Wilcox Tube Co.

Fire Fighting **K356***

36-p. booklet lists over 590 fire hazard materials and type of fire-fighting agent to use on each. Randolph Laboratories, Inc.

Catalyst Testing **K357**

4-p. bulletin describes operation and features of micro-feeder as a catalyst testing charge pump. Proportioneers, Inc.

Pneumatic Positioning Devices **K358**

8-p. bulletin describes design, application, principles of operation and construction features of pneumatic positioning devices for throttling control service. Technical Bulletin No. 104, Conoflow Corp.

Speed Reducers **K359**

8-p. bulletin describes features, and includes dimensional data, and capacity charts for vertical speed reducers. Bulletin No. 125, The Cleveland Worm and Gear Co.

V-Belt Drives **K360**

4-p. bulletin contains suggestions for determining the exact condition of V-belt drives. Allis-Chalmers Manufacturing Co.

Pumps **K361**

8-p. bulletin describes advantages and capacities of leak proof bellow type pumps. The Emlen Corp.

Pulp Density Scales **K362**

Bulletin S-1-C-B includes pulp density scale tables for determining per cent solids and conditioning times required for given volumes of pulps ranging from 5% solids at sp. g. 1.40 through 68% solids at sp. g. 3.20. Denver Equipment Co.

Pulp Density Scales **K363**

Bulletin S-1-C-B1 same as above but covers pulps from 5% solids at sp. g. 1.35 through 68% solids at sp. g. 1.85. Denver Equipment Co.

Companies

Arthur D. Little, Inc. **K364**

4-p. bulletin describes services of Arthur D. Little, Inc.

Armour Research Foundation **K365**

8-p. bulletin describes Armour plan for international technical assistance. Text in both English and Spanish.

Bakelite Division **K366**

32-p. booklet describes history of the Bakelite Division, Union Carbide and Carbon Corp., since its organization in 1910.

Trumbull Electric Mfg. Co. **K367**

6-p. booklet reviews Trumbull operations during 1949.

REACTION OF THE MONTH
with Hydrides — among the most powerful reducing agents in the chemical world . . .
$CO_2 + LAH \rightarrow CH_3OH$

LAH* reduces carbon dioxide at room temperature and pressure!

Hydrides — industry's great new tools for synthesis and reduction — are making laboratory curiosities possible . . . **and practical!** For example, by using ethereal LAH (Lithium Aluminum Hydride) as a reagent, carbon dioxide is readily reduced to methylalcohol **at room temperature and pressure:**

$$O{=}C{=}O + LiAlH_4 \rightarrow (CH_3O)_4LiAl \xrightarrow[H_2O]{HCl} CH_3OH + LiCl + AlCl_3$$

Ref: Nystrom, Yanko, Brown.
J. Am. Soc., 70, 486-489 (1948)

Reductions of this type ordinarily do not act on olefinic double bonds and require only equipment normally available. Several users are now performing reductions on a commercial scale with LAH* available from Metal Hydrides Inc.

* (Lithium Aluminum Hydride)

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Recommendations from Wyandotte Technical Service are not "off-the-cuff." Here's how we worked with one Caustic Soda customer.

We recommended that he use liquid caustic rather than solid. We helped him appraise his plant conditions. We drew up schematic diagrams outlining the handling of liquid caustic. We showed him how to dilute the liquid to the concentrations he needed. We drew up a cost estimate for the handling system. We recommended the types of equipment we felt he needed.

He turned our prints over to his engineers for execution. But we continued to advise him throughout the construction program. We inspected the finished system. And we were on hand when the switch was thrown for the first tank car shipment.

In one year's time, his savings paid for the installation . . . and began to return him a profit.

Service like this is not for the "favored few." It is available to any Wyandotte customer. Not just for Caustic Soda, but for Soda Ash or any Wyandotte product. Wyandotte Technical Service is not a sales gimmick. It is an outgrowth of our feeling that we should share with our customers the accumulated experience of 60 years of chemical making.

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CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE
PROPYLENE DICHLORIDE
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NEWS OF THE MONTH

New Construction

• **New adiponitrile plant** will be built by the Du Pont Co. to double its capacity at Niagara Falls, N. Y. The raw material will be corncobs and oat hulls—about 400,000,000 pounds will be used annually—and the product, a nylon intermediate, will be shipped to Belle, West Virginia, for further processing. Construction will start in the middle of this year, will be completed late next year.

• **Stauffer Chemical Co.** is building a new $1-million plant at Lowland, Tenn. for carbon bisulfide. It is expected to be completed late this year.

• **New expansion** program at Spencer Chemical Co.'s Jayhawk Works near Galena, Kans., will be devoted largely to fertilizer grade ammonium nitrate, will involve constructing a modified prilling plant.

• **Half-million coal tar byproducts plant** will be built by Reilly Tar & Chemical Corp. at Dallas, Tex. Lone Star Steel Co. will supply coal tar from its East Texas coke plant, and the two companies will share in the profits of the chemical enterprise.

• **Modern water treatment plant** to purify water waste from its steel mills along the Schuylkill River has just been completed by Alan Wood Steel Co., Conshohocken, Pa. Built to comply with Pennsylvania's stream pollution abatement program, the plant has been under construction for more than a year, cost over three-quarters of a million dollars.

• **Sam D. Hall & Sons,** distributors for Mid-South Chemical Co., has completed a $12,000 anhydrous ammonia plant at Widener, Ark.

• **Satisfactory progress** has been reported by The Hardesty Chemical Co., Inc., in the reconstruction and expansion of its Dover, Ohio, factory for plasticizers. It's expected to be completed soon.

• **Tennessee Eastman Corp.** has doubled capacity of its warehouse and distribution center at Lodi, N. J., to stock chemicals previously only available from its Kingsport, Tenn., plant.

• **Guy B. Panero, Engineers,** has organized a special group of engineers to work on "protective construction" methods for strategic industrial plants. This includes not only underground plants and dispersal over large ground areas, but specially developed construction and planning techniques to give optimum protection to most critical portions of a plant.

A. C. Finlay (left), appointed assistant director of the Biochemical Research and Production Division, Chas. Pfizer & Co.; and Donald G. Ward, named general traffic manager of Mathieson Chemical Corp. Mr. Finlay has been in charge of the Pfizer Culture Development Laboratories. Mr. Ward has been assistant general traffic manager of Shell Oil Co. and Shell Chemical Corp.

• **Hooker Electrochemical Co.'s** new pilot plant building at Niagara Falls is expected to be ready for use about May 1. All pilot plant operations, previously set up wherever space was available in the research department, will now be centralized in this building. It's a steel frame building with three walls of celocrete blocks with pivoted explosion windows. It will consist of five bays, three of which will be three stories high, the other two, two stories.

• **U. S. Atomic Energy Commission** is negotiating with Fluor Corp., Ltd., Los Angeles, for construction of its materials testing reactor to be built at the Reactor Testing Station near Arco, Idaho.

• **Barada & Page, Inc.,** distributor of agricultural and industrial chemicals, has let a contract for the first unit of its St. Louis distribution plant. A 13,500-square foot building, it will be expanded as future demands require.

General

• **A chemical company** climbed past the billion-dollar sales mark last year. Sales of the Du Pont Co. were $1.025 billion, about a 6% volume increase over 1948, a previous record year. Roughly half the increase was due to the greater physical volume of goods sold and half to higher sales prices.

• **The chemical industry** has jumped aboard the half-century band wagon. Theme of the Sixth National Chemical Exposition to be held in the Chicago Coliseum, September 5-9, will be "A Half Century of Chemical Progress." Exhibitors are expected to fashion their displays to focus attention on the contributions of chemistry to mankind over the last fifty years.

• **Chemical companies** report the following earnings on past operations:

Company	*Net Income After Taxes Year Ending December 1949*	*1948*
Abbott Laboratories	$ 10,011,000	$ 11,121,000
Allied Chemical & Dye Corp.	37,150,000	31,771,000
American Potash & Chemical Corp.	1,791,000	1,727,000
The Carborundum Co.	1,475,000	1,047,000
Celanese Corp. of America	20,641,000	39,484,000
Commercial Solvents Corp.	3,365,000	5,443,000
Dewey and Almy Chemical Co.	976,000	700,000
Dominion Tar & Chemical Co., Ltd.	1,811,000	2,187,000
E. I. du Pont de Nemours & Co. & Subsidiaries	213,672,000	157,446,000
Industrial Rayon Corp.	9,577,000	12,624,000
Merck & Co., Inc.	6,922,000	8,520,000
Minnesota Mining & Mfg. Co.	15,398,000	13,235,000
Sharp & Dohme, Inc.	4,760,000	3,911,000
Sterling Drug Inc.	13,007,000	12,722,000
Texas Gulf Sulphur Co.	23,673,000	24,231,000
Victor Chemical Works	2,874,000	2,159,000

• **The Second Annual Report** of the State of Maryland Water Pollution Control Commission has been prepared to outline the problems encountered and achievements in controlling pollution in Maryland during 1948.

• **The University of Michigan School of Public Health** is offering an inservice training course in industrial hygiene and human relations for safety personnel, June 19-21, 1950. Practical applications of safety principles will be sought by including process engineers and management on the special faculty for this course.

Washington

• **The industrial waste problem** is expected to get a boost from Congress in the form of a hearing by the House Ways and Means Committee on proposed legislation easing tax laws to **permit writing off** waste disposal installations in a far shorter period than is now permitted. The Public Health Service is being counted on to support such tax relief as it should stimulate action on this problem that is one of its major concerns.

• **A change** in the National Security Clause is expected to make sale or lease of nearly three-quarters of a billion dollars worth of surplus plants more attractive to prospective buyers

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or lessees. It generally gives a lessee the same advantages as an outright purchaser, including continuation of operations under a defense contract and compensation in event of the Government's exercising its option to take over the plant. This will apply only to future disposals of property.

• **Although rubber companies** agree that ultimate private owners' operation of rubber-producing facilities is the best solution for the nation, they cannot agree on how minimum output and consumption of synthetic rubber for purposes of national security can be agreed on, nor when production units should be transferred to private operation. This was made clear when the Rubber Manufacturers Association summarized the industry's position on the administration's proposal to sell Government-owned plants while maintaining control over production and use of rubber for the next ten years.

• **Among recent Department of the Army contract** awards to chemical companies is a contract let by Joliet Arsenal to Heyden Chemical Corp. for 91,600 tons of anhydrous ammonia at $5,422,308.

• **The Atomic Energy Commission** is making fission-product radioisotopes available in greater quantities and at reduced prices. For example, radioactive iodine has been reduced from $1 per millicurie to 75 cents, and such expensive items as radioactive promethium has been reduced from $100 to $75.

• **In his 1949 annual report** to Congress on synthetic fuel research and development by the Bureau of Mines, Secretary of the Interior Chapman reports that refined products could be produced from oil shale and coal at a price of 9 cents and 14.5 per gallon respectively, after allowing for a 6 per cent profit on the average unamortized capital and for income taxes.

Foreign Developments

• **The Engineering Equipment Users Association** has been formed in London by the Anglo-Iranian Oil Co., Imperial Chemical Industries, Lever Bros., and Unilever, Shell Petroleum Co., and Courtauld's Ltd., to standardize equipment and plant used throughout their organizations insofar as can be achieved in the interests of economy. It will work through the British Standard Institution, and hopes to make its findings available to other user firms.

• **British American Oil Co., Ltd.,** is planning a new oil refinery with an annual capacity of 2 million barrels at Edmonton, Alberta. It will include a combination crude oil distillation and thermal cracking unit, coking unit, fluid catalytic cracking unit and a complete chemical treating plant. Operating on crude brought by pipeline from Redwater, it will be the third British American refinery operating on western Canadian crude. Canadian Kellogg Company, Ltd. has the engineering and construction contract for all processing equipment.

Carl R. Peterson (left), appointed to represent Eston Chemicals, Inc., in New England; and Louis E. Tallman, named technical service representative for the West Coast area, The Dow Chemical Co. Mr. Peterson was previously connected with the Borden Co. Mr. Tallman has been with Dow since 1940.

New Companies

• **Pulva Corp.** has been formed recently in Perth Amboy, N. J., to market a complete line of impact-type pulverizers under the trade name, Pulva-Sizers.

• **Taylor Research Laboratories** have been established by Maurice C. Taylor at Niagara Falls, N. Y., to do consulting and sponsored experimental work particularly in the fields of electrolytic and chlorination processes, waste disposal, bleaching compounds, salt equilibria, and new product evaluation.

Ownership Changes

• **Monsanto Chemical Co.** has an option to purchase part of the extensive Vernal, Utah, phosphate deposits of Humphreys Phosphate Co., Denver. Monsanto plans exploratory prospecting for several years, will base its decision on expansion of present manufacturing facilities on results of the study.

• **The H. K. Ferguson Co.** has acquired the O. D. Conover Engineering Co., Cleveland, foundry design and construction specialists. The Conover organization will form the nucleus of a newly-established foundry division of Ferguson.

Company Notes

• **Elsie did not do so well** last year: The Borden Co. reports that its chemical business dropped from the sales and profit levels of 1948, in line with conditions prevailing in the industries served by this division. However,

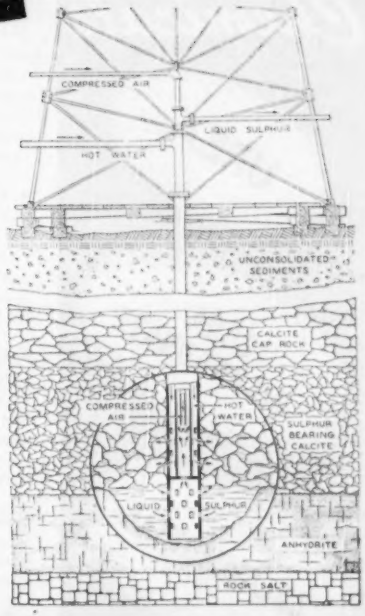
SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*WELL PIPING

The well equipment consists of pipes of various sizes, placed one within the other and extending from the surface into the sulphur deposit. A 10" or an 8" casing extends to and rests on the top of the cap rock. A 6" pipe, inside the casing, passes below it and reaches into the barren anhydrite. It is perforated at two different levels, separated by an annular collar. The upper set of perforations permits the hot water to enter the sulphur formation and the lower set permits the entrance of the molten sulphur to the discharge pipe fitted inside the 6" pipe.

When a well is "steamed" the hot water passes down the annular space inside the 6" pipe and outside the sulphur pipe and flows through the upper set of perforations into the porous formation. The entire mass through which the hot water circulates is raised to a temperature above the melting point of sulphur. The liquid sulphur being heavier than water, makes its way downward to form a pool and displaces water around the foot of the well, and rises in the well column through the lower perforations into a 3" pipe which is the sulphur discharge pipe. Compressed air released at the bottom of still another pipe fitted inside the 3" pipe rises and mixes with the sulphur column, forming an air lift which raises the liquid sulphur free of water to the surface.



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NEW YORK 6, N. Y.
21 WEST STREET
BOWLING GREEN 9-5360
SAN FRANCISCO
25 CALIFORNIA ST.
YUKON 6-3787

business was brisk in the last quarter, and their division is completing facilities for a 50% increase in its Durite plant capacity for plastic molding compounds.

• **C. Tennant, Sons & Co.,** New York, is now distributing alum and related products imported from England where Peter Spence & Sons, Ltd. is manufacturing these products in a recently completed plant at Widnes, Lancashire.

• **Reichhold Chemicals, Inc.** has reached an agreement with Poly-Resin Products, Ltd., Woodbrook, East London, South Africa, by which the latter will affiliate with Reichhold's chain of manufacturing plants and will produce its resins from the same formulae and processes used by the American company and its affiliates.

• **E. I. du Pont de Nemours & Co.** has established a new department to be known as the Film Department, to be responsible for research, production and sales of all products currently handled by the Cellophane Division of the company's Rayon Department.

• **Clark Microanalytical Laboratory,** Urbana, Ill., has added direct determination of fluorine in organic substances to its services. Teflon, Kel-F, and aromatic fluorine compounds are typical substances analyzed by this method.

• **Morehouse Industries** is now handling all its export business directly from its factory headquarters in Los Angeles.

• **Falk & Co.** has appointed Harold T. Illing Co. of Wisconsin its distributor in the Wisconsin, upper Michigan, Eastern Minnesota, Iowa and Northern Illinois territories.

• **Bjorksten Research Laboratories, Inc.** has opened an office in New York City.

• **General Electric Co.** has established a new apparatus sales district covering its St. Louis, Kansas City and Omaha territories. Headquarters will be in St. Louis.

• **Tennessee Products & Chemical Corp.** has opened a new sales office in Chicago.

• **Syntron Co.** has moved its New York sales and engineering office from Long Island City to 1860 Broadway, **N. Y.**

• **Twenty-eight representatives** of largest pulp and paper companies in Europe, touring the United States under a Marshall Plan project, visited **Hercules Powder Co. Experiment Station at Wilmington as part of their indoctrination in American developments in the pulp and paper industry.**

CALENDAR *of* EVENTS

AMERICAN CHEMICAL SOCIETY, Pacific Northwest regional meeting, Richland, Wash., June 9-10.
AMERICAN GAS ASSOCIATION, production and chemical conference, Hotel New Yorker, New York City, May 22-24.
AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, Swampscott, Mass., May 28-31.
AMERICAN INSTITUTE OF CHEMISTS, Hotel New Yorker, New York City, May 11-12.
AMERICAN OIL CHEMISTS' SOCIETY, spring meeting, Atlanta Biltmore Hotel, Atlanta, Ga., May 1-3.
AMERICAN PHARMACEUTICAL ASSOCIATION, Traymore Hotel, Atlantic City, N. J., April 30-May 15.
AMERICAN SOCIETY FOR QUALITY CONTROL, national convention and Midwest conference, The Milwaukee Auditorium, Milwaukee, Wis., June 1-2.
AMERICAN SOCIETY FOR TESTING MATERIALS, annual meeting and exhibit of testing apparatus and equipment, Atlantic City, N. J., June 26-30.
ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS, Hotel Shelburne, New York City, April 25.
BRITISH INDUSTRIES FAIR, London and Birmingham, England, May 8-19.
CHEMICAL INSTITUTE OF CANADA, annual conference, Royal York Hotel, Toronto, Canada, June 19-22.
CHEMICAL SPECIALTIES MANUFACTURERS ASSOCIATION, Drake Hotel, Chicago, June 12-13.
COLUMBIA UNIVERSITY, DEPARTMENT OF INDUSTRIAL ENGINEERING, conference on costs, budgeting and economics of industrial research, June 12-16.
FLAVORING EXTRACT MANUFACTURERS' ASSOCIATION, annual convention, Traymore Hotel, Atlantic City, N. J., May 7-10.
INSTITUTE OF FOOD TECHNOLOGISTS, decennial conference, Edgewater Beach Hotel, Chicago, May 21.
LIQUIFIED PETROLEUM GAS ASSOCIATION, Palmer House, Chicago, May 7-13.
MANUFACTURING CHEMISTS ASSOCIATION, annual meeting, Hotel Monmouth, Spring Lake, N. J., June 19-20.
NATIONAL CHEMICAL EXPOSITION, Chicago Coliseum, Chicago, Sept. 5-9.
SOCIETY OF COSMETIC CHEMISTS, spring meeting, Savoy Plaza Hotel, New York City, May 19.
U. S TECHNICAL CONFERENCE ON AIR POLLUTION, sponsored by Interdepartmental Government Committee, Washington, D. C., May 3-5.

PERSONNEL

Company Officers

• Charles H. Berle, since 1949 works manager of the Isco Chemical Division of **Innis, Speiden & Co.,** at Niagara Falls, N. Y., has been elected vice-president-in-charge of the Division.

• **Stein, Hall & Co., Inc.** has re-elected the entire board of directors of the company. In addition, William W. Strasser, Jr. and Leslie A. Jacobson were elected to the board.

• Henry P. Nelligan has been elected president and general manager of the **Eastman Gelatine Corp.,** Peabody, Massachusetts. He succeeds John P. Newbury, who died February 2.

• James T. Eaton, manager of research for **E. F. Houghton & Co.,** has been elected a member of the board of directors, and William F. MacDonald has been elected president of the com-

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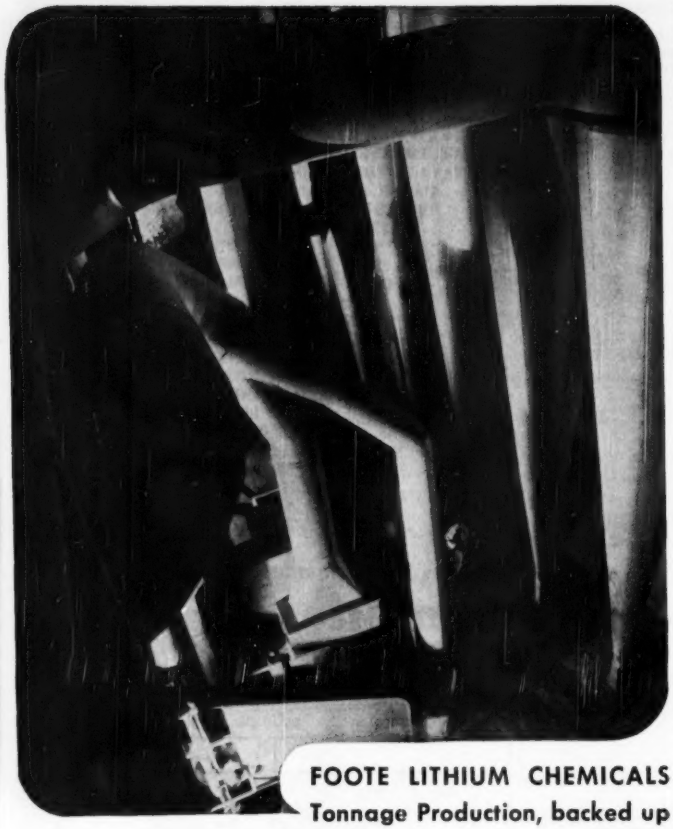

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pany. Mr. MacDonald will also continue to hold his present position as treasurer.

Britton Chance (left), who has received the $1,000 Paul-Lewis Award in Enzyme Chemistry; and George A. Richardson, presented the $1,000 Borden Award in the Chemistry of Milk. Dr. Chance is director of the Eldridge Reeves Johnson Foundation for Medical Physics, University of Pennsylvania. Dr. Richardson is professor of dairy husbandry and chemistry at Oregon State College.

• **Pure Carbonic Co.**, a division of Air Reduction Co., Inc., has appointed four new vice-presidents. A. J. Granata was made vice-president in charge of operating and engineering; L. F. Kilmarx, vice-president in charge of sales; E. C. McClintic, vice-president in charge of traffic; and S. B. Stouffer in charge of distribution.

Production

• Hiram B. Young, formerly superintendent of the Niagara Falls plant, has been made works manager, **Hooker Electrochemical Co.** Frank W. Dennis, formerly personnel director and employment manager, was named director of industrial relations for plants at Niagara Falls, N. Y.; Tacoma, Washington; and subsidiary Hooker-Detrex plants at Tacoma, and at Ashtabula, Ohio.

• J. Edgar Hill has been named factory superintendent, **National Adhesives (Canada) Ltd.**, Montreal. He was formerly plant superintendent for Armour & Co., at Chicago, and lately technical director of La Quimica Cia Industrial and Gelatines Argentinas in Buenos Aires, Argentina.

• A number of **Stanolind Oil and Gas Co.** employees have been transferred to the new Stanolind chemical plant at Brownsville, Texas.

John G. Munson, who was field project engineer during the construction of the plant, has been named assistant plant superintendent.

Other men being transferred are: George R. Ayton, Joe C. Weaver, Jr., Lloyd Christensen, Raymond S. Tolson, Jr., George C. Merrick and Max A. Meek.

• Arlington Kunsman has been named assistant general manager of the **Du Pont Co.'s** newly created Film Department. He has been manager of the Cellophane Division of the company's Rayon Department.

Research

• **American Cyanamid Co.** has appointed William P. Pennoyer as plant manager of its Stamford Research Laboratories, and William M. Bowes assistant plant manager.

Since 1945, Mr. Pennoyer has been

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HYDRAZINE SULFATE

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assistant to Carl Haner, the present plant manager, who is retiring from active service.

• W. P. ter Horst, formerly head of protein fiber operations for Virginia-Carolina Chemical Corp., has joined the research laboratory of **Mathieson Chemical Corp.**, Niagara Falls, N. Y.

• Kenneth S. Pitzer, 36-year-old director of research of the **United States Atomic Energy Commission,** received the $1,000 Precision Scientific Co. Award in Petroleum Chemistry during the Houston Session of the American Chemical Society's 117th national meeting. He was cited particularly for fundamental petroleum research which greatly aided in the understanding of chemical reactions involving nuclear energy.

Sales

• Robert H. Briggs, former manager of the Industrial Sales Division, has been named assistant general sales manager, **Chas. Pfizer & Co., Inc.**

Marshall N. deNoyelles has been appointed Eastern regional sales manager and Richard Burnham will head the Sales Service Department.

• Paul L. Johnstone has been appointed manager of the Market Development Division of **Hercules Powder Co.'s** Synthetics Department. He joined Hercules in 1940, was on leave of absence to the Navy from February, 1942 to November, 1945, and has been working on new product development since his return.

• Robert Wardrop has been appointed assistant to the vice president, **Pittsburgh Plate Glass Co.** Formerly manager of advertising and sales promotion for the firm's glass division, Mr. Wardrop will assist vice-president Frank W. Judson in handling major national accounts.

Died

• Henry E. Perry, president of **Commercial Solvents Corp.** He was sixty years old.

Mr. Perry joined Commercial Solvents in 1922 and became vice president and director in 1938. He was elected president in 1947.

• **Arthur E. Gibbs** of Wayne, Pennsylvania, after a brief illness at Summerville, S. C. He was 74 years old.

In 1903, he joined the Pennsylvania Salt Manufacturing Co. at Wyandotte, Michigan, where he invented and developed the Gibbs cell for the electrolytic production of chlorine, caustic soda and hydrogen from common salt brine.

In 1908, he organized the first separate Research and Development Department of Pennsalt. He continued as head and later as advisory technical director until his retirement in 1946.

• Horace W. Gillett, 66, former director of **Battelle Institute,** from a heart attack. One of the world's foremost metal scientists and a one-time associate of Thomas Edison, Dr. Gillett suffered the attack while returning from a hunting trip.

• Herbert M. Kaufmann, chairman and former president of the **Mutual Chemical Co. of America,** at his home in New York. He was 79 years old.

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CHEMICAL MARKETS

Gain Scored in Crude, Natural Gas Reserves

Proved reserves of crude oil and natural gas scored another major increase in 1949, reaching new all-time peaks. This was announced by the American Petroleum Institute and the American Gas Association in a joint report on the results of the near-record breaking rate of petroleum exploration in the 12-month period ending December 31, 1949.

Proved reserves of crude oil and natural gas liquids (condensates, natural gasoline and liquefied petroleum gases) were estimated at 28.3 billion barrels at the close of 1949, an increase of 1.5 billion barrels over the preceding year's total of 26.8 billion barrels. Proved reserves of natural gas were estimated at 180 trillion cubic feet. This is an increase of 6.5 trillion cubic feet over 1948's year-end total of 173.8 trillion cubic feet.

Proved reserves are the underground supplies which the oil and gas industry can draw upon for consumption at any time. They are the reserves whose location and extent have been proved and measured by drilling.

Production of crude oil and natural gas liquids in 1949 was estimated at 2,017,347,000 barrels, a drop of 168 million barrels under 1948's record-breaking total of 2,186,197,000 barrels. Production of natural gas was estimated at 6.2 trillion cubic feet, an increase of 237 billion cubic feet over the preceding year.

Ethylene Glycol Shows Steady Growth Pattern

Production of ethylene glycol in 1948 and through September 1949 was larger each month than during the corresponding month of the preceding year. The first break in this record occurred in October 1949, when production was 6 per cent below October 1948, but the pattern of the other months was resumed in November and December. November 1949 production was 4.7 per cent above that for the same month of 1948, while production of 38,090,197 pounds in December topped the rate of December 1948 by 9.2 per cent.

Total production for 1949 was 420,542,000 pounds, an increase of 16 per cent over the 362,238,000 pounds produced in 1948. This is significant since ethylene glycol is one of the few organic chemicals produced in greater volume in 1949 than in 1948.

Reportedly three-fourths of ethylene glycol production is sold as antifreeze. Total quantity for this purpose appears to be ample, and with new capacity on the way (*CI, Feb., 1950, p. 175*) there should be no difficulties in the future. Other users of glycol include the cellophane, alkyd resin, and explosives industries.

One-Third Increase Made In Fats and Oils Exports

United States exports of specified fats, oil, and oilseeds (in terms of oil) amounted to 154.8 million pounds in January 1950 compared with 114.6 million in that month of the previous year. Although there was a decrease in exports of several commodities, the significant one was in peanuts. January shipment of shelled peanuts dropped from 53.1 million pounds in January 1949 to 8.0 million. Peanut oil exports, however, rose from 4,000 to 9,304,000 pounds. Soybean oil, cottonseed oil, lard and tallow were considerably greater than in the first month of 1949.

Sulfur Fails to Match 1948's Record Production

The domestic sulfur industry produced 4,745,014 long tons during the year 1949, according to reports of producers to the Bureau of Mines. This was only slightly less than the record production for 1948 of 4,869,210 long tons. Mine shipments during last year totaled 4,789,311 long tons as compared with 4,978,912 in 1948. Apparent sales (calculated from production and change in stocks during the period) were 4,870,723 long tons in 1949, 5,015,230 in 1948. Stocks (including stocks at mines, in transit and in warehouse) at the end of 1949 totaled 3,099,305 long tons as compared with 3,225,014 long tons at the end of 1948.

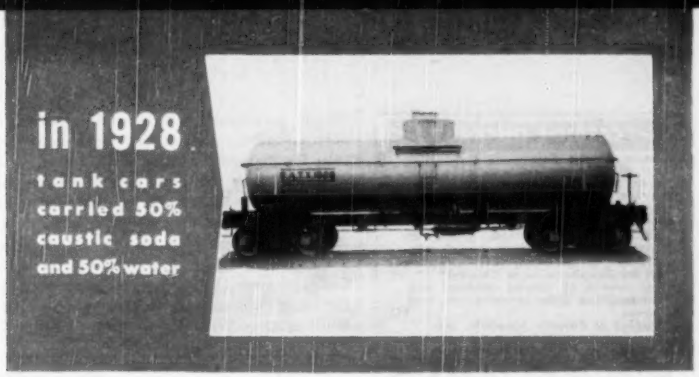
December production of native sulfur was 392,655 long tons and apparent sales 408,215 long tons. This was a decrease in production from November when 400,564 long tons were produced, but an increase in apparent sales from November's 383,030 long tons.

Non-Liquid Soap Dips 5% in 1949 Sales

Sales of non-liquid soaps as reported by 92 manufacturers for the entire year 1949 totaled 2,440,815,000 pounds according to the Association of American Soap & Glycerine Producers, Inc.

The Association Sales Census, taken quarterly, further indicates sales of liquid soap in 1949 as reported by 59 companies totaled 6,039,000 gallons. Synthetic detergent sales by 37 reporting manufacturers amounted to 712,456,000 pounds.

Based on data supplied by regular



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Cutaway view of GATX caustic soda car, showing 6 inches of insulation, heater coils and special lining.

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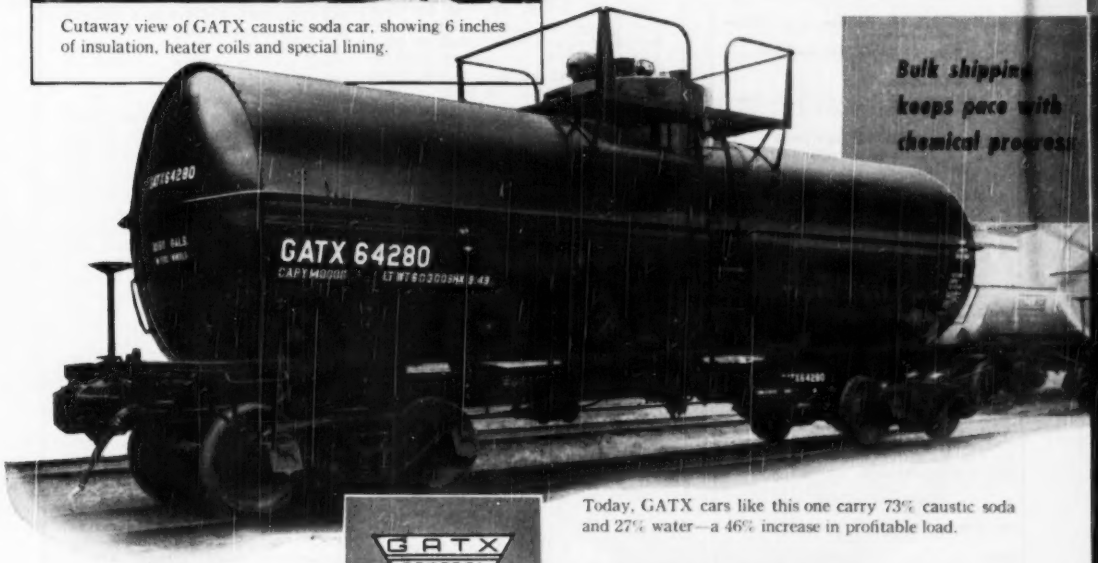

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Agitators for Liquids
by Julian C. Smith, March 1949 ☐

Ammonia
by Williard C. Cope, June & July, 1949 ☐

Cellulose
by Merle Heath, March, 1948 ☐

Centrifuges, Technical Improvements Bring New Uses
by Julian C. Smith, September, 1949 ☐

Diaphragm vs Amalgam Cells
by Robert B. MacMullin, July, 1947 ☐

Employee Relations Practices in the Chemical Industry
by Robert C. Forney, November, 1948 ☐

Industrial Carbon
by Raymond B. Ladoo and C. A. Stokes, October, 1948 ☐

Synthetic Chemicals for Agriculture
by R. H. Wellman, June and August, 1948 ☐

Synthetic Detergents, Main Types, Uses, Properties and Prospects
by John W. McCutcheon, November, 1947 ☐

U. S. Chlorine, Where It Is Made and Where It Is Used
by Ralph K. Lamie, April, 1948 ☐

Urea and Melamine Resins Press Toward New Goals
by James R. Dudley, February, 1949 ☐

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Census participants, which makes comparative analysis possible, non-liquid soap sales for the fourth quarter of 1949 were 29% less than the third quarter 1949. 14% under the fourth quarter 1948, and for the entire year 1949 were 5% under sales for the year 1948.

Comparable liquid soap sales for the fourth quarter 1949 were 16% above the third quarter and 2% above the fourth quarter 1948. For the entire year 1949, liquid soap sales exceeded 1948 sales by 7%.

No comparable data are available for synthetic detergent sales. For the fourth quarter 1949, 37 manufacturers reported sales totaling 181,323,000 pounds and for the entire year 1949, 712,456,000 pounds. In 1948, 17 companies reported fourth quarter sales amounting to 120,375,000 pounds and for the entire year 1948, 401,863,000 pounds.

Market Review

Although settlement of the coal strike was achieved before lack of coal supplies forced wholesale closings of chemical plants, effects of the long stoppage were not easily tossed off. In addition to the effect on coal chemicals, low supplies of coal had forced cutbacks by some heavy chemicals producers. With demand for some products equalling capacity, these losses were not easily made up.

Pricewise the market in industrial chemicals was generally a rising one. Muriatic acid was advanced $2 a ton to bring the price in tankcars to $22 for the 20° test material, f.o.b. works. Tankcar price of sulfuric acid was $14.40 per ton for 60° Bé; $17.75 for 66° Bé; and $19.85 for fuming 20%, following an advance of 65 to 85¢ a ton. Phosphorus oxychloride and trichloride were both increased 1¢ a pound, making the tankcar price for both 11¢. Increases were scheduled for both sodium and potassium chlorate. The former was to go up ½¢ to 8¢ a pound in carlots, works, while the latter, up 0.4¢ for the first change in eight years, was to be 9.4¢ a pound for crystals in carlots, works. In accordance with a 2¾¢ a pound increase in the price of the basic metal, tin based chemicals were advanced. Those affected included tin chloride, tin sulfate, tin tetrachloride and sodium stannate.

Shortages of coal chemicals were expected to continue for some time, benzol, toluol and xylol remaining in the critical category. Phenol followed the general upward trend with the natural material advanced 1¢ to a price of 12¢ in tankcars. U.S.P. up ½¢ to 13¢, and synthetic advanced ¼¢ to 13¢ a gallon in tankcars. Not all producers followed the later advance and there was a ¼¢ price spread. Refined pyridine was selling in carlots at 79½¢ a pound after a 5¢ increase. Two dyestuff intermediates, orthonitrochlorobenzene and paranitrochlorobenzene, moved up 1¢ in price to 18 and 19¢ a pound respectively. High price of chlorine and benzol was the reason.

First price activity in alcohol since July saw increases of 5-6¢ for ethanol which established a tankcar price for the tax free material at 35¢ a gallon. Tankcar price of proprietary solvent is now 38½¢, while specially denatured No. 1 is 37¢. Isopropyl alcohol was also boosted with the new price for the 99% material at 35¢ in tankcars; 45¢ in carlots; and 48¢ in less than carlots. Tankcar price of the 91% material is 32¢.

About 125 million gallons of Cuban molasses remaining from the 1950 crop were purchased by U. S. importers at a price of 5½¢ a gallon with provisions for discount on material taken before May. This contrasts with the price of 3-3½¢ at which molasses was sold to the British.

Insecticidal materials were no exception to the general market tenor. Shortages of raw materials, particularly benzol and chlorine, combined with a brisk export demand and early domestic ordering for the coming season, tightened supplies of many materials. Prices were heading up with an advance of 5¢ a pound for weed killer 2,4-D, and a 4¢ boost for DDT that set it at 32¢ a pound in carlot quantities.

On the fertilizer scene, potash production was again approaching capacity, and supplies were freer. Some manufacturers, however, felt the pinch of losses from the strike, and reportedly there was a cutback of 8% in contract deliveries of potash. Ammonium sulfate from coke oven was in better volume, although ammonium nitrate was short.

Price advances were also found among fine chemicals with salicylates up 2¢ a pound to establish U.S.P. acetylsalicylic acid at 50¢, U.S.P. methyl salicylate at 42¢, and U.S.P. sodium salicylate at 59¢. Calcium glycerophosphate, after a 15¢ a pound advance, was $1.80 a pound in 1,000 pound lots or more. Although decreased activity in some consuming lines weakened demand for glycerine somewhat, only small quantities of crude were in the market and prices on those were firm.

Exceptions to the upward trend were found in antimony oxide, lead oxide, and other lead pigments in line with lower metal costs. Antimony oxide, down 2¢ a pound, was 21¾¢ a pound in carload lots. The first reduction in lead oxides since November saw them down 1¢ with red lead, dry at 13¾¢; litharge, 12¾¢; and orange mineral, 16.1¢. The following lower prices were established for other lead pigments: white lead, basic sulfate, 12½¢; white lead, basic carbonate, 14¢; white lead, basic silicate, 13⅞¢; white lead in oil, 24.95¢; red lead in oil, 26½¢; leaded zinc oxide 35%, 11½¢; and leaded zinc oxide 50%, 11¾¢.

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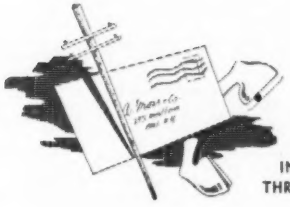

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Southern Industrial Sales Corp.
Tuscaloosa, Ala.

George Mann & Co., Inc.
Providence 3, R. I.

Baker & Gaffney
Philadelphia 7, Pa.

J. C. Ackerman Co.
Pittsburgh, Pa.

Moreland Chemical Co.
Spartanburg, S. C.

Smead & Small, Inc.
Cleveland 15, O.

Braun-Knecht-Heimann Co.
San Francisco 19, Cal.

Braun Corp.
Los Angeles 21, Cal.

James O. Meyers & Sons
Buffalo, N. Y.

J. W. Stark Co.
Detroit 2, Mich.

Charles Albert Smith, Ltd.
Toronto 3, Canada

Thompson Hayward Chemical Co.
Kansas City 8, Mo. (& Branches)

Abstracts of United States Patents

A Complete Checklist Covering Chemical Products and Processes

Printed copies of U. S. patents are available from the Patent Office at 25 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.

U.S. Patents from Official Gazette—Vol. 628, Nos. 4, 5 (Nov. 22-29) and Vol. 629, Nos. 1, 2, 3 (Dec. 6-20)

Agricultural

Producing a friable solid product from a normally non-friable DDT material by cooling within a period of not more than ten minutes from a temperature above its setting point to a temperature below about 60°C., and maintaining below about 60°C. until solidification is complete, the material being subjected to agitation at least during the initial stages of solidification. 2,491,160. Pennsylvania Salt Mfg. Co.

Fungistatic composition consisting of an organic plastic molding material and an inert filler, having dispersed throughout a solution of a phenyl mercuric carboxylate fungicide in hydrogenated castor oil. 2,491,287. Insl-X Corp.

Lime treated sabadilla seed insecticides. 2,491,468. Wisconsin Alumni Research Foundation.

Cellulose

Manufacture of hydrophilic cellulose ethers which are soluble in aqueous media comprising converting a cellulosic material to alkali cellulose by an aqueous solution of an alkali metal hydroxide, pressing to remove excess alkali solution, etherifying the alkali cellulose while wet with an etherifying agent selected from the group consisting of alkylating agents and hydroxy-alkylating agents until a cellulose ether is produced, neutralizing the alkali in the reaction mixture, and removing water from the reaction mixture, that improvement which comprises neutralizing the reaction mixture with an acid selected from the group consisting of organic and inorganic acids the hydrated alkali metal salts of which formed from the particular alkali metal of the aforementioned alkali metal hydroxide are stable. 2,488,631. American Viscose Corp.

Preparation of alcohols, glycols and hydroxyketones from cellulose by dissolving cellulose in Schweizer's reagent, subjecting the resulting cellulose solution to hydrogenation to form a co-precipitate of cellulose and metallic copper, subjecting said co-precipitate to hydrogenolysis for a period of hours in the presence of water and hydrogen to convert the cellulose into liquid and gaseous products containing substantial yields of alcohols, glycols and hydroxyketones. 2,488,722. Hamit H. Gurkan.

Fractionation process for the preparation of a derived cellulose acetate flake productive of substantially colorless plastics of optical clarity by dissolving cellulose acetate in a solvent comprising at least 50% acetone; adding an aliphatic hydrocarbon of from 3 to 7 carbon atoms, capable of precipitating the cellulose acetate in gelatinous form. 2,489,128. Hercules Powder Co.

Fractionation process for the preparation of a cellulose acetate material productive of substantially colorless plastics of optical clarity by dissolving cellulose acetate in a solvent consisting of acetone and mixtures of acetone with at least one organic liquid of the group consisting of lower aliphatic alcohols, lower aliphatic ketones, and lower aliphatic alcohol esters of the lower fatty acids. 2,489,142. Hercules Powder Co.

Preparation of a derived cellulose acetate material productive of substantially colorless, optically clear plastics by dissolving cellulose acetate in a solvent of the group consisting of methyl acetate and mixtures of methyl acetate with at least one organic liquid of the group consisting of lower aliphatic alcohols, lower aliphatic ketones, and lower aliphatic alcohol esters of the lower fatty acids. 2,489,143. Hercules Powder Co.

Insolubilization of cellulose ethers and esters by intimate contact with phosphorus trichloride, then into intimate contact with a compound selected from the group consisting of the primary and secondary aliphatic amines having from 1 to 3 carbon atoms, removing water-soluble reaction products, and drying the product which is insoluble in those organic solvents in which the untreated cellulose derivative is soluble. 2,489,225. Dow Chemical Co.

Production of cellulsoe propionate by esterifying cellulose with an esterification mixture comprising propionic acid, propionic acid anhydride and an esterification catalyst. 2,489,382. Celanese Corp. of America.

In stabilization of cellulose acetate, the step which comprises treating said cellulose acetate with an aqueous solution of a polyalkylene ether alcohol, decanting the aqueous solution and then heating said cellulose acetate. 2,490,164. Celanese Corp. of America.

In manufacturing artificial sponges from viscose wherein salt crystals and fibers are thoroughly mixed with a viscose solution and a dough-like mass formed, the steps of dividing the mass into sponge-shaped lumps and adding them directly to a water bath whereby the viscose is simultaneously coagulated and decomposed and the salt content is dissolved out leaving pores at the surfaces of the lumps. 2,490,178. American Enka Corp.

Continuous method for preparing cellulose esters having a high propionyl and butyryl content. 2,490,643. Eastman Kodak Co.

Activation of cellulose for acylation. 2,490,754. Eastman Kodak Co.

Ceramics

Transparent cadmium-free optical glass which contains BaO, PbO, SiO_2 and B_2O_3. 2,490,331. Corning Glass Works.

Liquid gold ceramic-decorating composition composed of a resinous gold compound, a solvent therefor, and a gold-flux, the resinous gold compound, the resinous gold reaction product of auric chloride and a cyclic terpene mercaptan. 2,490,399. E. I. du Pont de Nemours & Co.

Sintered refractory body characterized by a decrease in electrical resistance with an increase in temperature comprising SnO_2, an oxide selected from the group consisting of oxides of nickel, cobalt, iron manganese, copper, silver, gold and zinc, and an oxide selected from the group consisting of As_2O_3, Sb_2O_3, Ta_2O_5 and Bi_2O_3. 2,490,825. Corning Glass Works.

Sintered refractory body characterized by a decrease in electrical resistance with an increase in temperature, comprising SnO_2, UO_2, an oxide selected from the group consisting of SB_2O_3 and Bi_2O_3, and an oxide selected from the group consisting of the oxides of nickel, cobalt, iron manganese, copper, silver, gold, and zinc. 2,490,826. Corning Glass Works.

Improving the agglomerating characteristics of refractory powders of the calcined type by mixing therewith solid urea, heating and melting said urea whereby the liquid urea replaces the absorbed gases in the solid refractory powder, and cooling. 2,491,411. Societe Francaise Radio Electrique.

Fired ceramic product comprising a refractory oxide base selected from the group consisting of alumina and glucina, a carbonate flux selected from the group consisting of calcium carbonate, barium carbonate and strontium carbonate, clay as a binder, and steatite. 2,491,412. Societe Francaise Radio Electrique.

Coatings

Protecting a surface with a coating of a reaction product of an inorganic polysulfide having more than one and not more than six sulfur atoms in the molecule selected from the class consisting of alkali and alkaline earth metal polysulfides, and an organic dihalide in the presence of a silica gel. 2,489,567. Heveatex Corp.

Simultaneously cleaning and activating the surfaces of metals selected from the group consisting of ferrous, zinc, cadmium and aluminum metals to enable an improved subsequent formation of protective phosphate coatings comprising applying to the metal surface an aqueous solution consisting of a composition derived by dissolving in water a water soluble compound of at least one of the group of metals consisting of titanium, zirconium, lead and tin, the balance being disodium orthophosphate and evaporating the residue being dissolved in water to provide an alkaline cleaning composition suitable for cleaning the metal surface before applying a phosphate coating composition comprising a dilute aqueous solution containing a phosphate salt, phosphoric acid and an oxidizing agent. 2,490,062. Westinghouse Electric Corp.

Wrinkle drying coating composition consisting of a wrinkling oil, a thinner, and dextran benzyl ether. 2,490,070. New Wrinkle, Inc.

Heat strippable protective coating composition consisting of a cellulose acetate butyrate and an oil-like material consisting of mineral oil, a chlorinated diphenyl and an ester selected from the group consisting of the lower alkyl abietates and the hydrogenated lower alkyl abietates. 2,490,752. Eastman Kodak Co.

Coating composition consisting of a petroleum vehicle, oil soluble petroleum sulfonate rust inhibitor for ferrous metals, and an activator for said inhibitor, an oil-soluble C_{10} to C_{30} alkylated acidic material having two separate polar groups of which one is a terminal carboxyl group said carboxyl group being separated by at least one and not more than 4 carbon atoms from a second polar group selected from the class which consists of thio and carboxyl radicals. 2,491,066. Standard Oil Development Co.

Detergents

Scouring powder composition comprising a mineral substance selected from the group consisting of silica flour, tripoli, volcanic ash, feldspar, pumice and pumicite; an alkaline detergent material selected from the group consisting of alkali metal carbonates, -bicarbonates, -phosphates, -silicates, -borates; sodium alkyl aryl sulfonate whose alkyl and aryl groups are derived from petroleum hydrocarbon distillates and hydrocarbons of the benzene series, and sodium carboxymethylcellulose. 2,489,848. Wyandotte Chemicals Corp.

Dispersing agents prepared from a polymeric ester of 2-ethylhexanediol-1,3 and sulfosuccinic acid reaction product of an alkali bisulfite and a polymeric maleic-half ester of 2-ethylhexanediol-1,3 alkyd resin. 2,489,943. U. S. Rubber Co.

Preparing improved detergents by spray-drying an aqueous alkaline preparation of a sodium salt of an alkylated aryl sulphonic acid, glycerine, and a monoglyceride of a fatty acid having at least six carbon atoms. 2,489,955. Colgate-Palmolive-Peet Co.

Method for enhancing the gloss and transparency of soap flakes by passing preformed solidified flakes of soap through a steaming zone and then through a drying zone in such manner that they are kept separate from one another until their surfaces have become sufficiently dry to sticking. 2,490,089. Lever Brothers Co.

Paste shampoo comprising a water-soluble salt of a sulphate of a higher fatty acid amide of a hydroxy-alkyl primary amine in which the higher fatty acid radical contains from 8 to 18 carbon atoms, a water-soluble inorganic salt, a fatty acid amide of monoethanolamine in which the fatty acid contains predominately from 12 to 14 carbon atoms, and water. 2,490,459. Emulsol Corp.

Making a detergent by combining a high molecular weight fatty acid having 8 to 24 carbon atoms with a polyethylene glycol and then with a water soluble saturated aliphatic amine. 2,491,478. Arkansas Co., Inc.

Detergent composition comprising a surface-active organic sulphuric reaction product in the form of a water-soluble salt having detergent properties and having in its molecular structure a radical selected from the group consisting of sulphonic acid and sulphuric acid ester radicals, and a piperazine derivative. 2,491,992. Colgate-Palmolive-Peet Co.

Dyes & Pigments

Pad dyeing bath of the lacquer-in-water type having an insoluble pigment

and a pigment binder in the disperse phase, characterized by an effective amount of a soluble alginate salt dissolved in the water phase. 2,488,544. Sherwin-Williams Co.

Producing rutile seed for production of titanium dioxide having rutile crystal structure, by treating orthotitanic acid with an alkaline alkali metal compound to form an alkali metal titanate, and treating the titanate with a monobasic acid to completely convert the alkali metal content to the salt of the monobasic acid and to convert about 20% to 50% of the titanium content to the salt of the monobasic acid, and heating the resultant mixture. 2,488,755. American Cyanamid Co.

Dyeing fibers comprising polymerized vinyl chlorides, by dissolving in water an alkalizing reagent constituting an alkali metal salt and a basic dye capable of being transformed to a leuco stage upon alkalization and boiling to form a leuco dye bath, immersing the fibers in said bath to dye the same. 2,489,537. Henry T. Neumann and Leon G. Arpin.

Rhodacyanine dyes. 2,490,572. General Aniline & Film Corp.

Reaction product of the azo dye obtained by coupling diazotized p-amino azobenzene mono sulfonic acid with 2-benzoyl-5-naphthol-7-sulfonic acid and reacting the resulting dye wtih N-di-n-butyl ethanolamine. 2,490,703. General Aniline & Film Corp.

Reaction product of copper phthalocyanine obtained by reacting sulfonated copper phthalocyanine with an N-dialkyl ethanolamine wherein the alkyl groups each contain 8 carbon atoms. 2,490,704. General Aniline & Film Corp.

Azo dyestuffs. 2,490,967. Ciba Ltd.

Monoazo compounds. 2,491,481. Eastman Kodak Co.

Metalliferous azoic dyes. 2,491,928. Pharma Chemical Corp.

Inorganic

Separating cobalt from a double chloride solution of cobalt and nickel which comprises: (a) chlorinating the solution, in the presence of calcium carbonate required to react with the hydrochloric acid produced, to precipitate all of the chlorides of cobalt and nickel as the corresponding hydroxides, (b) further chlorinating to redissolve substantially all of the nickel hydroxide and only a minor amount of the cobalt hydroxide as chlorides and with the production of free hydrochloric acid, and then (c) separating the remaining cobalt hydroxide from the solution. 2,488,561. Ferro Enamel Corp.

Recovery of phosphorus and compounds of potassium and sodium from phosphate rock and Wyomingite charging a coke-fired blast furnace with phosphate rock and sufficient Wyomingite to make a free-flowing slag together with a sufficient amount of sulfur-bearing coke, firing to volatilize the phosphorus and the compounds of sodium and potassium, passing the volatilized materials through water and condensing the phosphorus free of alkali therein, and electrostatically precipitating the unwetted potassium and sodium compounds from the gases passing through the water. 2,488,604. Robert D. Pike.

Fluorescent composition consisting of magnesium pyrophosphate activated by cerium, thorium and magnanese. 2,488,719. General Electric Co.

Alkaline earth halophosphate phosphors. 2,488,733. General Electric Co.

Compositions of matter for removing heavy metal oxides or water-insoluble heavy metal salts consisting of a water-soluble hyposulfite, a water-soluble salt of an acid which is free of nitrogen, forms water-soluble complex heavy metal compounds and is selected from the group consisting of aliphatic polybasic carboxylic acids and aliphatic hydroxy carboxylic acids containing at least one carboxylic acid group, and an alkali. 2,488,832. Ciba, Ltd.

Making plastic hydrated lime by applying sufficient pressure to a thin layer of finely divided impalpably powdered substantially dry hydrated lime to agglomerate it into thin sheet-like forms to impart plasticity and disintegrating. 2,489,033. U. S. Gypsum Co.

Sodium bifluoride and ammonium bifluoride. 2,489,152. Pennsylvania Salt Mfg. Co.

Preparing condenser dielectric material from titanium dioxide, the crystal structure of which does not correspond with that of rutile, by heating the dioxide above 1200° C. in the presence of aluminum oxide. 2,489,246. National Lead Co.

Cyclic process for producing perchlorates and chlorites of different metals. 2,489,571. Cardox Corp.

Production of perchlorates and chlorine dioxide. 2,489,572. Cardox Corp.

Producing chlorates and chlorites of different metals. 2,489,573. Cardox Corp.

Production of perchlorates and chlorine dioxide. 2,489,574. Cardox Corp.

Production of chlorates and chlorites of different metals. 2,489,575. Cardox Corp.

Production of fluorophosphonic acid compounds by reacting a compound selected from the group consisting of HOR, HSR, NH_2R and HNRR' where R and R' are both selected from the group consisting of aliphatic, aromatic and hydroaromatic hydrocarbon radicals, with phosphorus oxydichlorofluoride. 2,489,917. Hamilton McCombie, Bernard Charles Saunders, Norman Bellamy Chapman and Robert Heap.

A piezoelectric crystal body composed of lithium sulfate monohydrate, lithium selenate monohydrate and mixtures thereof. 2,490,216. Brush Development Co.

In recovery of hydrogen chloride from chlorination of ethanol to produce chloral by cooling the off-gas in a series of stages, the cooling in each stage being only sufficient to liquefy a fraction of the organic vapors but not enough to effect solidification of a substantial amount of the liquefied vapors, separating the liquid formed in each cooling stage, passing the effluent gas from the final cooling stage into contact with water whereby an aqueous solution of hydrogen chloride is formed. 2,490,454. E. I. du Pont de Nemours & Co.

Making lead oxide. 2,490,519. Charles F. Haunz.

Production of oxygen by introducing in a stream of air a mixture consisting of potassium chloride, cupric chloride and cuprous chloride mounted on a powdered synthetic refractory oxide gel support, adjusting the residence time for said gel supported mixture in said fluidized bed to cause absorption of not less than one-twentieth mole of oxygen per mole of cuprous chloride, separating, continuously circulating the supported oxygen enriched supported mixture in suspension in a gas to a second reaction zone, continuously separating the desorbed supported mixture and recycling. 2,490,587. Socony-Vacuum Oil Co., Inc.

Purifying solid ammonium beryllium fluoride to remove lithium-containing impurities by heating the solid ammonium beryllium fluoride, admixing the resulting product with water, and separating the lithium-containing impurity in the form of a residue insoluble in the resulting ammonium beryllium fluoride solution. 2,490,633. Beryllium Corp.

In removing hydrogen sulphide from fuel gases with alkaline solution, the improvement comprising actifying the spent alkaline solution by aeration and thereby removing absorbed hydrogen sulphide. 2,490,799. Koppers Co., Inc.

Removing sulphur compounds from a fluid comprising: bringing said fluid into contact with an amine-containing medium to dissolve sulphur compounds and form an amine-sulphur complex; separating the purified fluid and extracting the amine-sulphur complex with a solvent which is immiscible with the medium; and recycling. 2,490,840. Koppers Co., Inc.

Production of lithium amide and other metal compounds by heating an oxide of an amide forming metal with a reducing metal capable of forming a nitride and in the presence of anhydrous ammonia. 2,490,851. Metal Hydrides Inc.

Producing commercial oxygen from air by injecting air into a regenerator in contact with a fluidized solid oxygen carrier comprised of a dissociable oxygen compound of a metal of variable state of oxidation. 2,490,986. Standard Oil Co.

Preparing magnesium oxide and hydroxide by adding water to a solution of magnesium methylate in methanol. 2,491,033. Permanente Metals Corp.

Producing alumimun sulfonates by heating a mixture of aluminum chloride sludge derived from a hydrocarbon conversion process. 2,491,043. Atlantic Refining Co.

Manufacturing titanium carbide containing less than 0.2% graphite by providing a mixture consisting of titanium dioxide and carbon and a compound of chromium existing as the oxide and forming carbide at the reaction temperature, said chromium compound being present in sufficient amount to form volatile chromium carbide with graphite formed in the titanium carbide and to provide a chromium content in the titanium carbide reaction product. 2,491,410. National Lead Co.

Preparing a luminescent magnesium orthotitanate activated by manganese by firing a mixture of compounds of the metals magnesium, titanium and manganese of the group consisting of the oxides of said metals and compounds which break down upon heating to yield the oxides in an oxidizing atmosphere. 2,491,865. General Electric Co.

Leather

Leather-like polyester-polyamides by reaction between a primary straight chain monoalkylolamine a saturated aliphatic hydrocarbon dicarboxylic acid which does not form an anhydride upon heating and a poly-functional compound selected from the group consisting of aliphatic hydrocarbon polyhydric alcohols containing at least three hydroxyl groups, aliphatic hydrocarbon polyamines having at least three amino groups with a hydrogen atom attached to each amino nitrogen atom and aliphatic hydrocarbon amino alcohols. 2,490,003. American Cyanamid Co.

Leather-like polyester-polyamides having a definite, highly oriented crystalline structure which is a heat cured condensation product of a primary straight-chain monoalkylolamine, a saturated aliphatic hydrocarbon dicarboxylic acid which does not form an anhydride upon heating and tricarballylic acid. 2,490,004. American Cyanamid Co.

Plasticized leather-like polyester-polyamides by reaction between a primary straight-chain monoalkylolamine a glycol and a saturated aliphatic hydrocarbon dicarboxylic acid, bringing about reaction between the product so obtained and a polyfunctional compound selected from the group consisting of aliphatic hydrocarbon polyhydric alcohols, aliphatic hydrocarbon polyamines, and aliphatic hydrocarbon amino alcohols. 2,490,005. American Cyanamid Co.

Metals

Drying selenium with high-frequency electric current under vacuum in the presence of a small amount of selenious acid. 2,488,839. American Smelting and Refining Co.

Electrodeposition of tin or lead-tin alloys. 2,489,523. General Motors Corp.

Bath for electrodepositing copper comprising an aqueous acid copper solution comprising essentially copper sulfate and sulfuric acid having dissolved therein a compound selected from the group consisting of cyanamide and dicyandiamide. 2,489,538. General Motors Corp.

Electroplating on a base metal consisting of chromium and iron, by cleaning and drying, dipping in a bath of a fused salt from the class consisting of sodium bisulphate and potassium bisulphate, withdrawing the filmed metal, allowing to cool, and electroplating in a bath of a metal from the class consisting of nickel and copper, whereby the bisulphate is dissolved and is replaced by a coating of said last mentioned metal. 2,491,126. Electric & Musical Industries Ltd.

Beneficiating cherty minerals containing a predominant proportion of chert to obtain soft high grade silica by heating to a calcining temperature thereby converting the silica from a state of extreme hardness to one of such softness that it can be easily ground, rapidly cooling, and separately recovering the silica component. 2,491,302. Harold J. Dunton.

Organic

Producing 2-nonenoic acid by treating a material selected from the group consisting of 3-nonenoic acid and a mixture of 2-nonenoic acid and 3-nonenoic acid with an aqueous solution of an alkali metal hydroxide, heating until a substantial amount of the salt of 3-nonenoic acid has been converted to the corresponding salt of 2-nonenoic acid, separating the solid phase from the liquid phase, neutralizing to form free acid, and separating the resulting mixture of 2-nonenoic acid and 3-nonenoic acid according to known means. 2,488,557. Givaudan Corp.

Chlorinated camphene product liquid at ordinary temperatures and consisting of chlorinated camphene in which is dissolved a solvent for chlorinated camphene. 2,488,590. Griffin Chemical Co.

Zinc salt of an acid ester of ortho phosphoric acid, wherein each esterifying radical is a hydrocarbon group containing not less than 5 carbon atoms. 2,488,662. California Research Corp.

Inhibiting darkening of vegetable drying oil which has been oxidized by an oxygen-containing gas on subsequent heating by water extracting said oxidized oil prior to said further heating. 2,488,680. Raybestos-Manhattan, Inc.

Preparation of mahogany sulfonic acids by contacting a substantially aromatic petroleum lubricating oil fraction with an acid sludge separated from a petroleum lubricating oil fraction after treatment of the same with a sulfonating agent selected from the class consisting of sulfuric acid of at least 98% strength, fuming sulfuric acid, sulfur trioxide, chlorsulfonic acid and fluorsulfonic acid. 2,488,721. Standard Oil Development Co.

Conversion of an olefin to a higher molecular weight derivative by contacting said olefin with a catalyst comprising a solid oxygen-containing complex formed by heating oxygen, boron trifluoride and a hydrocarbon. 2,488,752. Universal Oil Products Co.

Recovering sodium diethylmetanilate from an aqueous slurry containing inorganic salts by bringing said aqueous slurry into interfacial contact with an organic liquid having a high solvent action for sodium diethylmetanilate and a low solvent action for inorganic salts, said organic liquid having the formula R-OH wherein R is a radical selected from the group consisting of open chain hydrocarbon radicals having 4-9 carbon atoms, hydrocarbon radicals containing a six-membered ring and having 6-9 carbon atoms, furfuryl and hydrogenated furfuryl radicals, separating and recovering sodium diethylmetanilate from said organic liquid. 2,488,885. American Cyanamid Co.

In the purification of benzol to remove CS_2 the method which consists in treating the vapors of crude benzol in which the CS_2 is contained with anhydrous ammonia, condensing the vapors and holding the condensate

for a time period promoting substantial conversion of the sulfur containing products into products soluble in aqueous alkali and then separating. 2,488,895. Alfred R. Bayer and Edward J. Murphy.

Preparing 1-methyl-5-amino-acridine by reacting 2-methyl-diphenylamine-2'-carboxylic acid with phosphorus pentachloride, neutralizing, aminating and isolating 1-methyl-5-amino-acridine therefrom. 2,488,904. Sterling Drug Inc.

Manufacture of 1:4-dicyanobutene by reacting hydrogen cyanide with a 1:2 substituted butene-3 compound chosen from the group consisting of 1:2-dihydroxy butene-3, 1:2-epoxybutene-3, 1-chloro-2-hydroxy butene-3, 1-hydroxy-2-chloro butene-3, 1-bromo-2-hydroxy butene-3, 1-cyano-2-hydroxy butene-3, and 1 hydroxy-2 cyano butene-3, by heating in the presence of a catalyst comprising a copper salt. 2,488,913. Imperial Chemical Industries Ltd.

Production of furfural from vegetable materials by action of dry steam containing dry gaseous chlorine. 2,488,981. Bombrini Parodi-Delfino-Societa per Azioni.

Forming a complex by reacting a compound containing a nonconjugated unsaturated nonhydroxylated fatty acid grouping having from 10 to 24 carbon atoms in its carbon chain with an acyclic olefinic acid having less than 10 carbon atoms in its carbon chain and then heating the adduct with a ricinoleic acid or its completed esters. 2,448,999. Rachel Mifflin Ullmann.

In production of 2-amino-thiazole from an aqueous solution. 2,489,038. American Cyanamid Co.

Recovery of naphthalene and homologues from petroleum products by extracting the mixture with iminodipropionitrile to produce raffinate and extract layers, separating, cooling the extract whereby alicyclics separate, recovering the separated liquids and recovering the condensed nuclei aromatics. 2,489,042. American Cyanamid Co.

Preparing thioacetamides, $CH_3C{=}SX$, in which X is a monovalent heterocyclic radical of the class consisting of morpholine, piperidine, and pyrrolidine, ioined to the thioacetyl portion through its imino-nitrogen atom by reacting sulfur, a heterocyclic imine from the class consisting of morpholine, piperidine, and pyrrolidine, and a member of the class consisting of vinyl ethers and vinyl esters. 2,489,094. Rohm & Haas Co.

Esters of 5-oxy-1,2 carboxy cyclohexanes. 2,489,103. Shell Development Co.

Preparation of a dinitroparaffin which consists of contacting an alkyl pseudonitrole with an organic solvent selected from the group consisting of carbon tetrachloride, benzene and a highly aromatic petroleum fraction. 2,489,122. Socony-Vacuum Oil Co., Inc.

Preparing siloxanes by interacting hexamethyldisiloxane and a cyclic dimethylsiloxane with an alkali metal hydroxide. 2,489,138. Corning Glass Works.

Preparing a hexaorganodisiloxane by interacting two differently substituted hexaorgandisiloxanes in which the organic groups are selected from the group consisting of alkyl and monocyclicaryl radicals in intimate contact with an alkali metal hydroxide, whereby shifting of the triorgano silicon groups occurs with formation of a hexaorganodisiloxane which contains triorgano silicon groups corresponding to the triorgano silicon groups of the two reacting disiloxanes. 2,489,139. Corning Glass Works.

Preparation of a gem-dinitroparaffin having both nitro groups attached to a secondary carbon atom, by reacting a secondary alkyl pseudonitrole with a gas consisting essentially of free oxygen, in the presence of a catalytic amount of an oil-soluble, metal organic compound selected from the group consisting of ferric naphthenate and cobalt salts of organic ether acids; and separating said dinitroparaffin. 2,489,151. Socony-Vacuum Oil Co., Inc.

Separation of vanillin from alkaline solutions by extracting with tertiary butyl a'cohol. 2,489,200. Ontario Paper Co. Ltd.

In separating the isomers of diphenylbenzene obtained in the pyrolytic diphenyl synthesis process, the step of treating a mixture containing substantially only meta- and para-diphenylbenzene with atmospheric steam while centrifuging the same. 2,489,215. Monsanto Chemical Co.

Synthesis of biotin. 2,489,232. Hoffmann-La Roche Inc.

Imidzalido-tetrahydrofurans. 2,489,233. Hoffmann-La Roche Inc.

A 3,4-(2'-keto-imidazolido)-thiophane. 2,489,234. Hoffmann-La Roche Inc.

Synthesis of biotin. 2,489,235. Hoffmann-La Roche Inc.

Synthesis of biotin and related compounds. 2,489,236. Hoffmann-La Roche Inc.

3,4-(2'-keto-imidazolido)-2-ω-hydroxy-pentyl-thiophanes. 2,489,237. Hoffmann-La Roche Inc.

Debenzylation of benzylated imidazolido-thiophane compounds. 2,489,238. Hoffmann-La Roche Inc.

Pyridine quaternary salts. 2,489,247. William R. Warner & Co., Inc.

Stabilizing tetrahydrofuran by incorporating p-cresol. 2,489,260. E. I. du Pont de Nemours & Co.

Stabilizing furan by incorporating hydroquinone. 2,489,265. E. I. du Pont de Nemours & Co.

Production of an alkane-sulfonic anhydride by oxidizing an anhydrous charging stock comprising a dialkyl disulfide with free oxygen in the presence of a catalytic quantity of a nitrogen oxide. 2,489,316. Standard Oil Co.

Preparation of a saturated hydrocarbon sulfonyl chloride by reacting the anhydride of a saturated hydrocarbon sulfonic acid with hydrogen chloride. 2,489,317. Standard Oil Co.

Producing a sulfonic acid by oxidizing a hydrocarbon disulfide by passing said disulfide, a gas containing free oxygen, and a catalytic quantity of a nitrogen oxide. 2,489,318. Standard Oil Co.

Selective conversion of propane to 2-nitropropane and 2,2-dinitropropane, by reacting propane with a nitrating agent. 2,489,320. Socony-Vacuum Oil Co.

Producing phthalic anhydride from a vaporizable aromatic hydrocarbon by partial oxidation which comprises passing an oxygen-containing gas, steam and a stream of said vaporizable aromatic hydrocarbon upwardly through a bed of spherical particles of an oxidation catalyst. 2,489,346. Standard Oil Development Co.

Oxidizing a vaporizable aromatic hydrocarbon by maintaining a mass of spherical particles of vanadium oxide catalyst within a reaction zone that is in the lower portion of a vertical tube, passing oxygen-containing gas and vapor of the aromatic hydrocarbon upwardly through said mass of spherical particles at such a vertical velocity as to maintain said particles in motion without entrainment. 2,489,347. Standard Oil Development Co.

Hydrolysis of benzylcyanide by mixing benzylcyanide with concentrated aqueous hydrochloric acid and stirring the two materials together in the absence of any added organic solvent for the benzylcyanide. 2,489,348. Hoffmann-La Roche Inc.

3-amino-7-halo-benzotriazine-1,2,4. 2,489,351. Merck & Co., Inc.

Halogen compounds of 3 amino-benzotriazine 1,2,4 oxide-1. 2,489,352. Merck & Co., Inc.

7-halogen-3-hydroxy-benzotriazine-1,2,4-oxide-1. 2,489,353. Merck & Co., Inc.

7-halogen-3-chloro-benzotriazine-1,2,4-oxide-1. 2,489,354. Merck & Co., Inc.

Benzotriazines. 2,489,355. Merck & Co., Inc.

Benzotriazines and process for preparing the same. 2,489,356. Merck & Co.

7-halogen-3-hydroxy-benzotriazine-1, 2, 4. 2,489,357. Merck & Co., Inc.

7-halogen-3-chloro-benzotriazine-1,2,4. 2,489,358. Merck & Co., Inc.

7-halogen-benzotriazine-1, 2, 4 having in the 3-position a substituent selected from the class consisting of benzylamino-(4-pentyl-1-diethylamino)-amino, N-methylanilino, n-butylamino, and di-n-propylamino radicals. 2,489,359. Merck & Co., Inc.

Chlorinated derivatives of alkylene polyamines. 2,489,363. Frederick C. Bersworth.

5-hydroxymercurivanillin. 2,489,380. Sulphite Products Corp.

Benzene-azo-benzene-azo-oleyl phenol. 2,489,384. Celanese Corp. of America.

4-chloro-3-trifluoromethylphenol. 2,489,423. Sterling Drug Inc.

Amino pyrimidines. 2,489,526. Imperial Chemical Industries Ltd.

Making 8-hydroxy quinoline by providing divided sodium hydroxide, adding water, heating, introducing a compound taken from the group consisting of quinoline-8-sulfonic acid and its alkali and alkaline earth metal salts, agitating the same, whereby the sodium salt of 8-hydroxy quinoline is formed, and dissolving in dilute mineral acid to form 8-hydroxy quinoline. 2,489,530. Dar-Syn Laboratories, Inc.

Production of 1-alkyl-piperidines by reacting with a hydrobalic acid an N-alkyl-tetrahydrofurfurylamine. 2,489,546. Societe des Usines Chimiques Rhone-Poulenc.

Extracting cotton seed oil wherein unhulled seeds are first extracted with an alcohol and then extracted with a light petroleum ether. 2,489,599. Constant Trottmann.

In a continuous process for the production of acetaldol, continuously feeding acetaldehyde and acetaldol catalyst into a shallow body of liquid largely composed of a mixture of acetaldehyde and acetaldol and containing an acetaldol catalyst. 2,489,608. Les Usines de Melle (Societe Anonyme).

Dehydrating and purifying an aqueous n-propyl alcohol contaminated with ethyl alcohol, isopropyl alcohol and non-alcoholic oxygenated aliphatic compounds which comprises distilling in the presence of an aliphatic ether collecting a distillate comprising water, ethyl alcohol, isopropyl alcohol, non-alcoholic oxygenated aliphatic compounds and the aliphatic ether, and recovering substantially pure anhydrous n-propyl alcohol as a distillation residue. 2,489,619. Standard Oil Development Co.

Stable, basic tetravalent titanium compound, the acylate corresponding to the formula $Ti(OH)_x(OCOR)_{4-x}$, wherein x is an integer from 1 to 3 and R is an alkyl radical containing not more than 5 carbon atoms. 2,489,651. E. I. du Pont de Nemours & Co.

Producing N-di-(β-benzoylethyl)-lower alkylamines by reacting a lower monalkylamine hydrohalide salt with a formaldehyde and an acetophenone. 2,489,668. Hoffmann-La Roche Inc.

Preparation of 1-alkyl-3-benzoyl-4-hydroxy-4-phenyl-piperidines. 2,489,669. Hoffmann-La Roche Inc.

Dialiphaticaminoalkylcardanol. 2,489,672. Tide Water Associated Oil Co.

Dihydropyrogallol. 2,489,695. Hoffmann-La Roche Inc.

Evaporating aqueous solutions containing HCN. 2,489,703. American Cyanamid Co.

Manufacture of fatty acids and glycerine from fats by splitting the fat in the presence of water into a mixture of glycerine and fatty acids, utilizing the sensible heat in the product to remove water from the mixture, commingling the resulting mixture with an inert and volatile organic solvent having a preferential solubility for the lower melting point fatty acids and glycerine at low temperatures, cooling to crystallize a higher melting point fatty acid fraction and separating the crystals from the solution of solvent, lower melting fatty acids and glycerine. 2,489,713. Swift & Co.

Cyano-substituted tetrahydropyran compounds. 2,489,729. Shell Development Co.

Separation of 3-picoline from a mixture with at least one of the bases 4-picoline and 2,6-lutidine, by treating the base mixture with copper sulfate to precipitate 3-picoline in the form of its copper sulfate addition compound, and separating. 2,489,884. Allied Chemcial & Dye Corp.

In vapor phase hydrogenation of nitroxylene to xylidine over a nickel catalyst, the steps that comprise activating unreduced nickel catalyst by passing in contact with converter effluent gas resulting from such a hydrogenation process. 2,489,886. Allied Chemical & Dye Corp.

5,5,5-trichloropentyl phenyl ethers. 2,489,935. E. I. du Pont de Nemours & Co.

Beta-piperidino-ethyl alpha-(alpha-naphthyl)-normalbutyrate hydrochloride. 2,489,950. Regents of the University of Michigan.

Simultaneous introduction of fluorine and bromine into an aromatic hydrocarbon by mixing bromine trifluoride with an aromatic halocarbon. 2,489,969. Purdue Research Foundation.

Simultaneous introduction of fluorine and bromine into a polycyclic non-fused-ring halocarbon by mixing bromine trifluoride with the polycyclic non-fused-ring halocarbon. 2,489,970. Purdue Research Foundation.

Nitrating a furan derivative to produce a 5-nitrofuran, by adding the furan derivative to acetic anhydride and concentrated nitric acid, until completion of the reaction; and converting the nitration intermediate into the nitrated furan derivative by diluting the nitration mixture with water and adding a base which forms a buffer system in the presence of acetic acid. 2,490,006. Eaton Laboratories, Inc.

Cyclic compounds of the class consisting of undecafluoropiperidine and of fluoroalkylpiperidines which have the formula: $C_nF_{2n+1}C_5F_9NF$ where n is an integer. 2,490,098. Minnesota Mining & Mfg. Co.

Cyclic compound tridecafluorocyclohexyl amine, $C_6F_{11}NF_2$. 2,490,099. Minnesota Mining & Mfg. Co.

Producing an alkali salt of an alkoxy-isobutyric acid by bringing together chloretone with an alkali metal hydroxide, in the presence of an alcohol, water, allowing the mixture to stand at room temperature, and thereafter heating. 2,490,109. Polymerisable Products Ltd.

Producing thiophenol by reacting chlorobenzene and hydrogen sulfide in the presence of a highly absorbent solid catalyst. 2,490,257. Socony-Vacuum Oil Co., Inc.

Oil-soluble sulfurized nitriles of organic acids having at least ten carbon atoms and selected from the group consisting of fatty acids, rosin acids and mixtures of fatty and rosin acids. 2,490,271. Sun Oil Co.

Addition product of a 2,3-dimethyl butene and formaldehyde by reacting said dimethyl butene with formaldehyde in the presence of an acidic condensation catalyst to form 2,3,3-trimethyl 4-01 butene-1. 2,490,276. Standard Oil Development Co.

Coupling phenol by heating phenol with di-tertiary-butyl peroxide. 2,490,282. Shell Development Co.

Production of an oxygenated compound by the catalyzed addition of carbon monoxide and hydrogen to an unsaturated reactant in two synthesis steps using a synthesis gas rich in carbon monoxide in the first step and a synthesis gas lean in carbon monoxide in the second step. 2,490,283. Shell Development Co.

Preparing ketals by reacting in the presence of a mercury catalyst and a strongly acidic catalyst isopropenyl acetate and a non-tertiary alcohol from the class consisting of (a) alcohols having only the alcoholic hydroxyl radical as a functional group, (b) alcohols having an alcoholic hydroxyl radical and an ether group as the sole functional groups, and (c) alcohols having an alcoholic hydroxyl radical and an ester group as the sole functional groups. 2,490,337. Rohm & Haas Co.

Production of aminoacetal from chloroacetal by heating chloroacetal with anhydrous ammonia in the absence of alcohol and other solvents. 2,490,385. Heyden Chemical Corp.

Subjecting an alpha,beta-olefinic unsaturated aldehyde to reaction with a halogen in the gaseous state selected from the group consisting of chlorine and bromine whereby the hydrogen atom of the formyl group is substituted by an atom of the halogen to produce as product the alpha, beta-olefinic unsaturated acid halide. 2,490,386. Shell Development Co.

Hydropyranyl-oxazines, thiazines, oxazolidines, and thiazolidines. 2,490,392. Shell Development Co.

Hydropyranyl derivatives of hexahydropyrimidines and imidazolidines. 2,490,393. Shell Development Co.

In alkylating a hydroxybenzenecarboxylic acid by reacting the acid with an olefin in the presence of molten antimony trichloride to dissolve the reactants, the improvement providing a more complete separation of the materials formed by extracting from the inorganic phase, with a liquid aliphatic hydrocarbon, the aliphatic hydrocarbon-soluble components prior to extracting with an aqueous inorganic acid. 2,490,444. Shell Development Co.

Producing fully saturated halogenation addition products of the aldehydes of the mono-heteroatomic five membered rings by diluting with a solvent then rapidly introducing halogen until the aldehyde has taken up substantially four atoms of halogen per molecule of aldehyde and the point of substantial saturation has been reached. 2,490,462. Borden Co.

Preparation of polypentaerythritols by adding acetaldehyde and potassium hydroxide solution to a formaldehyde solution. 2,490,567. Trojan Powder Co.

Manufacture of orthophosphoric acid esters and amides by treating an organic compound selected from the group consisting of alcohols, phenols, and primary amines with a solution of a dibenzylhalogenophosphonate selected from the group consisting of dibenzyl chlorophosphonate and dibenzyl chlorophosphonate and dibenzyl bromophosphonate in an inert solvent. 2,490,573. Hoffmann-La Roche, Inc.

Dealkylating alkoxy arylamino compounds free of aryloxy groups by heating in a distillable saturated hydrocarbon liquid a mixture of said alkoxy aryl-amino compound and an aluminum halide Friedel-Crafts agent. 2,490,601. General Aniline & Film Corp.

Separating para-ethyl phenol from meta-ethyl phenol by mixing with an organic base of the class consisting of 4-methylquinoline, 2,6-dimethylpiperidine, 4-methylaniline, and aniline, and producing in the resulting mixture a sufficiently low temperature to form crystals of para-ethylphenol-organic-base, separating and decomposing said crystals to liberate para-ethylphenol in purified form. 2,490,670. Reilly Tar & Chemical Corp.

Separating metaethylphenol from a mixture consisting mainly of meta-ethylphenol and paraethylphenol by mixing with orthotoluidine. 2,490,671. Reilly Tar & Chemical Corp.

Nitroethylpyridines. 2,490,672. Reilly Tar & Chemical Corp.

Metal picotinyl fluosilicate in which the metal is selected from the group consisting of copper, zinc, cobalt and nickel. 2,490,705. Allied Chemical & Dye Corp.

Preparing zinc nicotinyl fluosilicate by adding nicotine to a solution of zinc fluosilicate in methanol. 2,490,706. Allied Chemical & Dye Corp.

Preparation of diazoacetic esters. 2,490,714. E. I. du Pont de Nemours & Co.

Metal mercaptides of 2-amino-benzenethiol. 2,490,717. Hoffmann-La Roche Inc.

Esters of acids of phosphorus. 2,490,748. Eastman Kodak Co.

2-trifluoromethyl-1-3-butadiene. 2,490,753. Eastman Kodak Co.

N-alkenyl lactamides. 2,490,756. Eastman Kodak Co.

$ClCF_2$—$(CF_2)_n$—CF_2. 2,490,764. Kinetic Chemicals, Inc.

N-2-(2-N-piperidylethylmercapto)ethyl-p-amino-benzamide. 2,490,780. Sterling Drug Inc.

Preparing aliphatic peracids and substituted aliphatic peracids by reacting an aliphatic acid with hydrogen peroxide, and thereafter adding acyl anhydride. 2,490,800. Buffalo-Electro-Chemical Co., Inc.

Continuous process for making aryl amines by mixing a non-aqueous phase comprising chlorobenzene with an aqueous phase comprising an ammoniacal compound selected from the group consisting of ammonia and lower alkyl amines and a copper chloride catalyst. 2,490,813. Standard Oil Co.

Benzhydryl beta hydroxy alkyl amines. 2,490,834. Parke, Davis & Co.

Benzhydryl beta haloalkyl amines. 2,490,835. Parke, Davis & Co.

Preparing cyclopentadiene by passing vapors of dicyclopentadiene and impurities, heating whereby dicyclopentadiene is cracked. 2,490,866. Pittsburgh Plate Glass Co.

Production of phenyl vinyl sulfide, by subjecting bis-phenyl ethylene sulfide to pyrolytic decomposition. 2,490,875. Celanese Corp. of America.

Aminoalkyl-phenyl lactones. 2,490,937. Abbott Labs.

Basic esters of trisubstituted acetic acids. 2,490,964. Ciba Pharmaceutical Products, Inc.

Producing a beta-substituted mercaptan by reacting an aliphatic mercaptan containing from 2 to 16 carbon atoms with an olefin sulfide containing from 2 to 9 carbon atoms per molecule in the presence of sodium ethylate. 2,490,984. Phillips Petroleum Co.

Producing a beta mercapto-thio-ether, by reacting an aliphatic mercaptan containing from 2 to 16 carbon atoms with an olefin sulfide containing from 2 to 9 carbon atoms in the presence of boron fluoride. 2,490,985. Phillips Petroleum Co.

In reaction between ethylene and air to produce ethylene oxide, in the presence of a contact catalyst comprising barium peroxide and finely divided silver, the method of controlling the rise of temperature during the exothermic reaction which comprises maintaining a heat absorptive material from the group consisting of massive metallic copper and silver in admixture with the contact catalyst to absorb the exothermic heat of reaction without permitting rise in temperature to cause complete oxidation of the ethylene. 2,491,057. Atlantic Refining Co.

Preparing a metallo-organic halide complex for promoting organic reactions by condensing alkoxy metal halide with metal halide. 2,491,116. Standard Oil Development Co.

In preparation of a copper bromide-nicotinonitrile complex in particulate form, heating 3-bromopyridine to about the boiling point; adding cuprous cyanide, whereby a hot crude pourable copper bromide-nicotinonitrile complex is formed, and pouring the syrupy reacted mixture into a large volume of substantially neutral water, whereby pellets of said crude complex are formed. 2,491,253. American Cyanamid Co.

Stabilizing a liquid peroxydicarbonate by stirring the peroxy dicarbonate while exposed to gas containing oxygen in elemental state. 2,491,397. Pittsburgh Plate Glass Co.

Esters of 2-cyclohexene-1-caproic acid. 2,491,442. Dow Chemical Co.

Preparing cyanuric chloride by passing cyanogen chloride over charcoal until the charcoal becomes saturated with a material chosen from the group consisting of adsorbed cyanogen chloride, cyanuric chloride and a mixture thereof, thereafter continuing the passage of cyanogen chloride over the charcoal, and recovering the cyanuric chloride. 2,491,459. American Cyanamid Co.

Alkylation of mono-hydric phenols with a branched chain olefine comprising

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dissolving tetraphosphoric acid in mono-hydric phenol and treating this solution at an alkyl phenol forming temperature not exceeding about 70° C. 23,183. Sherwin-Williams Co.

N-dialkyl alkoxynaphthamidines. 2,491,473. Burroughs Wellcome & Co. (USA) Inc.

Drying oil formed by reacting an olefinic hydrocarbon fraction with liquid hydrogen fluoride, and recovering the drying oil from the hydrofluoric acid layer. 2,491,496. Universal Oil Products Co.

Preparing methoxylated halogenated lignin by treating a mixture containing ligno-cellulosic material, methanol, and water, with a halogen. 2,491,499. Diamond Alkali Co.

Catalytically oxidizing an aromatic hydrocarbon to produce phthalic anhydride, by flowing vapor of the aromatic hydrocarbon mixed with oxygen-containing gas, contacting with free-falling fused vanadium oxide microspheres. 2,491,500. Standard Oil Development Co.

Preparation of 2-mercapto-3-arylpyrimidines by reacting an alpha, beta-unsaturated ketone, a salt of thiocyanic acid and a primary aromatic amine in the presence of a strong non-oxidizing acid. 2,491,509. B. F. Goodrich Co.

Generation of synthesis gas substantially free of carbon. 2,491,518. Hydrocarbon Research Inc.

Hydrocarbon-substituted silyl methane compounds. 2,491,833. General Electric Co.

Producing a 1,4-dihalobutane by reacting tetramethylene oxide with a hydrogen halide in the presence of a compound of the formula R≡NYX wherein each R is from the group consisting of hydrogen and alkyl and aralkyl radicals Y is an alkyl radical and X is a halogen. 2,491,834. E. I. du Pont de Nemours & Co.

Preparation of acetals by reacting carbon monoxide and hydrogen in the presence of a cobalt hydrogenation catalyst with methanol, and an acyclic hydrocarbon having one unsaturation and that ethylenic. 2,491,915. E. I. du Pont de Nemours & Co.

Nitrating in the vapor phase lower alkanes having from 3 to 8 carbon atoms thereby producing a gaseous mixture containing nitroalkanes, unreacted alkanes, nitrogen oxides, carbon oxides and unsaturates. 2,491,919. Commercial Solvents Corp.

Diesters of 1-ketophosphonic acids. 2,491,920. E. I. du Pont de Nemours & Co.

Nitroamides of aromatic acids. 2,491,924. Commercial Solvents Corp.

Preparing an *a,a*-dialkylarylmethyl alcohol by catalytically hydrogenating an *a,a*-dialkylarylmethyl hydroperoxide in the presence of an active metal hydrogenation catalyst. 2,491,926. Hercules Powder Co.

Manufacture of alkyl esters of monomethylene ethers of levo keto-2 gulonic acid comprising heating bismethylene, ethers of levo keto-2 gulonic acid and aliphatic alcohols in the presence of an esterifying catalyst. 2,491,933. N. V. Chemische Fabriek "Naarden."

Smoothly distilling hydrocarbon solvent from aqueous resid acid soap solutions by conducting said distillation in a condition of from 10% to 45% free resin acid content by weight of total resin acid material present in the presence of alkali metal salt. 2,491,038. Continental Research Corp.

Packaging

Fluid adhesive composition comprising an aqueous dispersion of asphalt, water-soluble synthetic resin and a water-soluble glue selected from the group consisting of water-soluble animal glues, water-soluble vegetable glues and alkali metal silicates. 2,489,170. Stancal Asphalt & Bitumuls Co.

Paper & Pulp

Paper coating composition comprising finely divided aluminum, casein, urea, sodium pyrophosphate and dimethylolurea. 2,491,113. S. D. Warren Co.

Bleaching wood pulp by forming a mist-like dispersion of an alkaline aqueous peroxide solution in air and passing through said space in contact with said dispersion a granular, free-flowing, high consistency groundwood pulp. 2,492,047. E. I. du Pont de Nemours & Co.

Petroleum

Feldspar-iron-alkali Fischer-Tropsch catalyst by fusing iron oxide, a mixed silicate of aluminum and a metal selected from the group consisting of the alkali and alkaline earth metals. 2,488,530. Phillips Petroleum Co.

Breaking a petroleum emulsion of the water-in-oil type which comprises subjecting the emulsion to the action of a treating agent comprising a petroleum sulphonic acid body having a nitro group attached to the hydrocarbon nucleus thereof. 2,488,593. Standard Oil Development Co.

Alkylation of isobutane with butylene in the liquid phase in the presence of an aluminum chloride-hydrocarbon complex liquid catalyst and a hydrogen chloride promoter. 2,488,602. Texas Co.

Alkylation of isobutane with propylene in liquid phase in the presence of an aluminum chloride aliphatic hydrocarbon complex liquid catalyst and a hydrogen chloride promoter. 2,488,603. Texas Co.

Lubricants of the extreme pressure type consisting of petroleum base lubricating oil and phosphorus-containing reaction product of a sulfide of phosphorus with a methyl ester of abietic acid which has been saturated with a material selected from the class which consists of hydrogen and sulfur. 2,488,618. Standard Oil Development Co.

Catalytic cracking of residual hydrocarbons. 2,488,713. Universal Oil Products Co.

In a catalytic cracking process in which there is a cracking zone and a catalyst regeneration zone, the steps of withdrawing catalyst from the regeneration zone, separately contacting the withdrawn catalyst with anhydrous hydrogen chloride and with anhydrous chlorine and employing the contacted catalyst in the cracking zone. 2,488,718. Standard Oil Development Co.

Regeneration of catalyst from a catalytic cracking process by contacting the used catalyst with a gaseous mixture of anhydrous hydrogen chloride and chlorine. 2,488,744. Standard Oil Development Co.

Refining hydrocarbon distillates by passing a hydrogen sulphide-free hydrocarbon distillate through a bed of adsorbent clay, then mixing it with an aqueous solution of an alkali metal hypochlorite to react with the mercaptan sulphur and at least 30-40% of the total sulphur content of the distillate, separating and removing spent treating solution, removing entrained spent treating solution from the gasoline, then passing the clear distillate into contact with an aqueous solution of alkali metal hydroxide, separating and clarifying and then passing it through a bed of adsorbent clay. 2,488,855. Joseph O. Denton, Jr.

Maintaining acid catalyst concentration in an alkylation process. 2,488,943. Anglo-Iranian Oil Co., Ltd.

Lubricant comprising a mineral lubricating oil and, to stabilize said oil against oxidation and corrosion deterioration, a reaction product obtained by reacting an organic compound with hydrogen sulfide and ammonium hydrosulfide and treating the reaction product with an inorganic compound selected from the group consisting of phosphorus sulfide, sulfur halide, elemental sulfur and alkali polysulfide. 2,489,249. Shell Development Co.

Lubricating Oil having superior viscosity-temperature characteristics consisting of a high molecular weight oil-soluble polymer of a material selected from the group consisting of alkyl esters of acrylic acid and alkyl esters of homologues of acrylic acid, the alkyl radical of said alkyl esters containing at least 4 carbon atoms, and light mineral oils; an oil-soluble soap of acid material selected form the group consisting of high molecular weight, fatty acids and naphthenic acids, and a polyvalent metal selected from the group consisting of aluminum and magnesium. 2,489,281. California Research Corp.

Lubricants having superior viscosity-temperature characteristics, which consists of a hydrocarbon lubricating oil; a thermoplastic polymeric material; and as dispersing agent of an oil-soluble soap material selected from the group consisting of aluminum and magnesium soaps and mixtures thereof. 2,489,300. California Research Corp.

Lubricating oils consisting of a hydrocarbon lubricating oil; a high molecular weight thermoplastic material dispersed in said lubricating oil having recurring oxygen-containing polar groups; as dispersing agent of an oil-soluble, polyvalent metal soap of a fatty acid to maintain the polymeric material dispersed in the lubricating oil, and an oxygen-containing polar solvent solubilizing agent for the polymeric material. 2,489,301. California Research Corp.

Preparation of an iron-freed acid-treated kaolin catalyst by extracting the clay with acid to dissolve a substantial quantity of the aluminum content of the clay, subjecting the acid extract to purification effecting the removal of iron compounds therefrom and precipitating an aluminum compound from the purified acid extract in the presence of the clay residue to deposit the said aluminum compound onto said clay residue. 2,489,309. Houdry Process Corp.

Forming adsorbent contact masses from clay containing iron and aluminum by treating the clay with a gas reactive to form iron salts with iron compounds present in the clay, leaching the treated clay with dilute acid to remove iron discarding the acid liquor containing dissolved iron compounds, further acid treating to dissolve the aluminum content forming an acid extract containing aluminum as a salt of the acid employed, and precipitating an aluminum product by reaction of the acid extract with an alkali metal silicate in the presence of the clay residue. 2,489,332. Houdry Process Corp.

In production of contact masses from clay containing iron compounds, the steps comprising: mixing the clay with concentrated mineral acid, heating and diluting the mix with water to form a suspension comprising dissolved acid-extracted substances and residual clay solids, subjecting the suspension to electrolysis to effect removal of iron, admixing the purified suspension with a solution of alkali metal silicate to form with aluminum salts present therein a silica-alumina reaction product embedding the suspended clay solids, permitting the reaction product to set to a hydrogel, drying and subjecting the obtained dried gel to washing and treating with aluminum salt, drying the washed gel, adding water thereto to form a plastic mix and forming the mix into pellets. 2,489,333. Houdry Process Corp.

Effecting hydrocarbon conversion by contacting a hydrocarbon oil with a catalyst under vapor phase such that gasoline boiling range hydrocarbons are contained in the effluent product and coke-like material is deposited in the catalyst, said catalyst being a plural hydrous gel of silica and of a refractory oxide. 2,489,334. Houdry Process Corp.

Synthesizing hydrocarbons by the interaction of carbon monoxide and hydrogen by contacting with a finely divided highly active iron type synthesis catalyst maintained in a fluidized state at a pressure below 350 lbs. 2,489,451. Standard Oil Development Co.

Cracking process for the production of olefins from hydrocarbons. 2,489,628. Socony-Vacuum Oil Co., Inc.

Liquid lubricating composition consisting of a mineral oil having dissolved therein (a) a polymerized ester to improve the viscosity index and (b) to reduce the increased emulsifying tendency imparted by said polymerized ester a substantially water-insoluble tertiary amine from the group oil soluble trialkyl amines and oil-soluble amines. 2,489,671. Tide Water Associated Oil Co.

Treating rock asphalt, oil shales and like material, to recover petroleum products by dissolving the oil-soluble portion in a solvent oil. 2,489,701. John W. Coast and Clarence H. Dragert.

Treating oil shales, to recover hydrocarbon products by separating volatile materials from the shale by distillation assisted by a current of hot gases, separating the resultant vapor by fractional condensation, subjecting the non-volatile residue from the distillation to the action of an oxygen-containing gas to burn out all combustible material to generate hot products of combustion and to produce a hot inorganic material suitable for use as a cracking catalyst. 2,489,702. John W. Coast and Clarence H. Dragert.

Catalytically isomerizing a hydrocarbon in the presence of a catalytic material comprising a compound of hydrogen fluoride and a fluoride selected from the group consisting of the fluorides of the alkali metals, the alkaline earth metals and ammonium. 2,489,975. M. W. Kellogg Co.

Lubricating oil comprising an oil of lubricating viscosity and a di-ester of azelaic acid, the terminal carboxyl groups of which are substituted with at least one diphenyl silicon containing chemical group. 2,490,068. Continental Oil Co.

In manufacturing heaviers for bentonitic drilling mud suspensions the steps of reducing impure barium sulphate to finely divided form, removing impurities by flotation, roasting to remove flotation reagents and render the material wettable, then adding an inorganic sulphate inhibitor to form insoluble hydroxides to avoid formation of barium bentonite when added to drilling mud. 2,490,069. Milwhite Co., Inc.

Preparing a catalyst diluent by forming inorganic oxide particles, commingling said particles with a solution of an organo-metallic compound containing an alkali metal, and thereafter calcining to burn off the organic portion of said organo-metallic compound. 2,499,260. Universal Oil Products Co.

Producing high octane naphtha by subjecting a naphthenic naphtha to hydroforming in the presence of a hydroforming catalyst selected from the group consisting of molybdenum oxide, cobalt oxide-molybdenum oxide and cobalt molybdate and added hydrogen. 2,490,287. Standard Oil Development Co.

Conversion of high boiling hydrocarbons into valuable lower boiling products in the presence of a particle form adsorbent material. 2,490,336. Socony-Vacuum Oil Co., Inc.

Synthesis of hydrocarbons from hydrogen and carbon monoxide in the presence of a fixed bed synthesis catalyst. 2,490,463. Phillips Petroleum Co.

Hydrogenation of oxides of carbon by contacting with a catalyst comprising molybdenum disulfide and an alkaline compound of an alkali metal. 2,490,488. Phillips Petroleum Co.

Polymerization of olefins by contacting an olefin with a solution of a metallic halide polymerization catalyst. 2,490,578. Socony-Vacuum Oil Co., Inc.

Fuel composition comprising a gasoline hydrocarbon fraction, tetra-ethyl-lead, and an effective scavenging amount of acetylene tetrabromide. 2,490,606. Shell Development Co.

Moving bed hydrocarbon conversion system. 2,490,774. Houdry Process Corp.

Isomerization process which comprises subjecting an isomerizable saturated hydrocarbon to the action of a catalyst comprising a mixture of an aluminum halide and a zinc halide. 2,490,853. Universal Oil Products Co.

Catalytic conversion of hydrocarbons. 2,490,975. Phillips Petroleum Co.

Tacky lubricating grease composition consisting of a dibasic acid ester. 2,491,028. Standard Oil Development Co.

Lubricating composition consisting of a lubricating liquid of a dibasic acid ester, said liquid being thickened to a grease-like consistency by a metal soap of a fatty acid, and a copolymer of styrene and isobutylene. 2,491,054. Standard Oil Development Co.

Lubricating grease composition consisting of lubricating oil, a metal soap of a fatty acid, a high molecular weight copolymer of a polymerizable mono-olefinic compound having a cyclic nucleus, and an aliphatic olefin of 3 to 8 carbon atoms. 2,491,055. Standard Oil Development Co.

Catalytic conversion of hydrocarbons. 2,491,099. Sinclair Refining Co.

Contacting fluid solids with gases. 2,491,135. Standard Oil Development Co.

Catalytic conversion of hydrocarbon oil. 2,491,303. Texas Co.

Catalytic conversion of hydrocarbons. 2,491,407. M. W. Kellogg Co.

Fluid lubricating composition comprising polyalkylene oxide fluids, poly-alkylene glycol fluids and poly (alkylene oxide-alkylene sulfide) fluids, and 1,2-dihydroxybenzene. 2,491,432. Shell Development Co.

Aqueous drilling mud comprising a hydratable alkaline earth metal clay dispersed in water and a viscosity-reducing material derived from waste sulfite liquor, composed mainly of lignosulfonate of the group consisting of alkali metal lignosulfonate and alkaline earth metal ignosulfonates 2,491,436. Sun Oil Co.

Aqueous drilling mud comprising a hydratable alkaline earth metal clay, a material derived from waste sulfite liquor as an amorphous solid and composed mainly of a lignosulfonate selected from the group consisting of alkali metal lignosulfonates and alkaline earth metal lignosulfonates, and quebracho to prevent excessive increase in viscosity and gelation. 2,491,437. Sun Oil Co.

Grease composition of increased water resistivity comprising mineral lubricating oil, metal soaps of fatty acids, and a resinate of a divalent metal selected from the group consisting of zinc, cadmium, calcium and magnesium. 2,491,441. Socony-Vacuum Oil Co., Inc.

Photographic

Production of an organic complex containing silver halide in suspension which comprises forming a suspension of silver halide in an aqueous solution of gelatin, and adding in the presence of an electrolyte, sufficient of an anion soap to cause precipitation of the gelatin phase containing the silver halide and separating the so-formed gelatin/anion soap complex. 2,489,341. Ilford Ltd.

Polymeric color formers consisting of a polyvinyl acetal of a hydroxyl polymer. 2,489,655. E. I. du Pont de Nemours & Co.

Monobasic salts of phosphate acids as stabilizers for diazotype prints. 2,489,728. General Aniline & Film Corp.

A light-sensitive layer on a suitable base comprising a diazo derivative of a p-diamino compound of the benzene series and 4-bromoresorcinol. 2,490,605. General Aniline & Film Corp.

Cellulose carboxylic ester silver halide emulsions sensitized with benzothiazole and benzoselenazole quaternary salts. 2,490,745. Eastman Kodak Co.

Fuchsone dyes in a direct positive photographic process. 2,490,758. Eastman Kodak Co.

Polymers

In recovering resin from resin-bearing coal of the Utah type wherein soluble resin is extracted with a hydrocarbon solvent, subjecting the solvent extracted resin to an oxygen containing gas. 2,488,546. Interchemical Corp.

Salt of a polyvalent drier metal and an addition product made up of a compound selected from the group consisting of alpha, beta-unsaturated-alpha, beta-dicarboxylic aliphatic acids and their anhydrides in combination with a low molecular weight unsaturated cyclic polymer of a branch-chain, 1,3-hexadiene having a straight chain of 5 carbon atoms in the molecule. 2,488,550. Shell Development Co.

Production of polymeric vinylidene chloride film. 2,488,571. Dow Chemical Co.

Water-insoluble vinyl resin containing hydroxyl groups attached to the chain of polymerized vinyl radicals, which has been reacted with a mixture of chromium trioxide and phosphoric acid. 2,488,651. Bakelite Corp.

Polymerizing in aqueous emulsion unsaturated hydrocarbons of the group consisting of styrene, conjugated diolefines in the presence of a catalyst combination composed of diazoaminobenzene mixed with an activating compound of the group consisting of hdyroquinone, monochlorohydroquinone, p-quinone, pyrogallol, quinhydrone, dichlorohydroquinone and catechol. 2,488,690. Carbide and Carbon Chemicals Corp.

Polymers of the condensation product of formaldehyde with unsaturated esters of ketocarboxylic acids. 2,488,883. Shell Development Co.

Hardenable urea-aldehyde condensate combined with a curing catalyst comprising an organo-boron trihalide complex formed by adding boron trifluoride to phenol. 2,489,145. Borden Co.

Preparing a condensation product by reacting dicyandiamide and acrylonitrile in the presence of a strongly basic catalyst selected from the group consisting of a quaternary ammonium hydroxide, an alkali metal oxide, an alkali metal hydroxide, an alkaline earth metal oxide, and an alkaline earth metal hydroxide. 2,489,181. American Cyanamid Co.

Adding, to a liquid of the class consisting of styrene and solutions of polystyrene in styrene, polystyrene and a styrene-insoluble pigment. 2,489,226. Dow Chemical Co.

Condensation products of mononuclear monohydric phenols, formaldehyde, and mononuclear dihydric phenols. 2,489,336. Borden Co.

Preparing resinous materials by heating an aldehydo non-aromatic carboxylic acid, having one aldehydo and one carboxylic group and having 2 to 16 carbon atoms in a chain between said functional groups, and a polyamine having as the sole reacting functional groups hydrogen-bearing amine groups. 2,489,366. Rohm & Haas Co.

Vinyl chloride resins and a heat stabilizer comprising a dialkyl tin dialcoholate of a monohydroxyl compound containing at least one carbon double bond and at least 3 carbon atoms. 2,489,518. Bakelite Corp.

Concentrating a solution of synthetic linear polyamide made from alkylene diamine and an aliphatic dicarboxylic acid, in acid selected from the group which consists of hydrochloric acid, sulphuric acid, nitric acid and phosphoric acid which comprises dissolving in said solution sufficient of a salt of an acid selected from the said group to cause the solution to separate into two layers one of which contains a higher concentration of said synthetic linear polyamide than the other and isolating the layer containing a higher concentration. 2,489,569. Tootal Broadhurst Lee Co., Ltd.

Vinyl resin plasticizers comprising a thiophene polymer. 2,489,674. Socony-Vacuum Oil Co., Inc.

Neutralizing peroxide catalyst in styrene emulsion polymerization by adding to the emulsion one of the group consisting of the hydroxides of barium, strontium and calcium and the hydrates thereof. 2,489,959. Monsanto Chemical Co.

Copolymer of a vinyl aromatic compound and an alkylidine phthalide. 2,489,972. Monsanto Chemical Co.

Liquid urea-formaldehyde compositions. 23,174. E. I. du Pont de Nemours & Co.

Producing a moldable composition by digesting a woody material in an alkaline solution in the presence of elemental sulfur. 2,490,078. Diamond Alkali Co.

Thermoplastic composition comprising ethyl cellulose plasticized with refined mineral oil and liquid partially hydrogenated mixed isomeric terphenyls. 2,490,148. Celanese Corp. of America.

Alkali-resistant mastic floor tile comprising a vinyl polymer selected from the group consisting of polyvinyl chloride and polyvinyl acetate-chloride, a plasticizer about 15% of which is a rosin acid nitrile selected from the group consisting of dehydrorosin acid nitrile and hydrorosin acid nitrile, and a filler. 2,490,247. Hercules Powder Co.

Resins from thiophene and turpentine. 2,490,270. Socony-Vacuum Oil Co., Inc.

Preparing diorganosiloxane polymers by contacting cyclic diorganosiloxanes in which all of the organic radicals are selected from the group consisting of alkyl and monocyclicaryl radicals with an alkali metal hydroxide 2,490,357. Corning Glass Works.

Polymeric materials from isopropenyl toluene. 2,490,372. American Cyanamid Co.

Copolymerizing maleic anhydride and styrene in xylene solution. 2,490,489. E. I. du Pont de Nemours & Co.

Composition for rendering paper, regenerated cellulose and the like moisture-proof and heat sealing which comprises a copolymr of ethylene and vinyl acetate, a hard brittle thermoplastic resin and a moistureproofing wax. 2,490,550. E. I. du Pont de Nemours & Co.

Compositions of matter comprising mixtures of a synthetic resin containing gel and a rubber. 2,490,626. Harvel Research Corp.

Aqueous dispersion of a salt of an N-monoalkyl substituted polymeric amic acid. 2,490,677. E. I. du Pont de Nemours & Co.

Preparing a fluid polymeric silicic ester by heating a tetraalkyl orthosilicate with an anhydrous unsubstituted saturated lower aliphatic monocarboxylic acid containing from 2 to 4 carbon atoms. 2,490,691. E. I. du Pont de Nemours & Co.

Polymerization of diolefin hydrocarbons in the presence of potassium persulfate as a polymerization catalyst. 2,490,712. Phillips Petroleum Co.

Controlling polymer properties in emulsion polymerization by controlling intensity of agitation. 2,490,713. Phillips Petroleum Co.

α-carbamoxyacrylic esters and resins prepared therefrom. 2,490,757. Eastman Kodak Co.

Resinous product produced by the condensation of resorcinol with formaldehyde. 2,490,927. Borden Co.

Flexible shaped articles comprising a gelatinized polyvinylchloride composition and a resinous interpolymer of a methacrylate ester of a saturated aliphatic alcohol and methacrylamide. 2,491,102. Imperial Chemical Industries Ltd.

Preparing purified polyesters of the polycarboxylic acid-glycol type from a crude polyester mixture, which comprises dissolving said crude mixture in a light paraffinic mineral base lubricating oil fraction, cooling to cause precipitation of less soluble polyester fractions, filtering and thereafter adding to the residual solution a lower aliphatic alcohol antisolvent and a solubilizing agent for said anti-solvent to precipitate the soluble polyester from the mineral oil. 2,491,350. Standard Oil Development Co.

Copolymer of unsaturated fumarate alkyd resin. 2,491,409. American Cyanamid Co.

Interpolymers of butadiene, acrylonitrile, and a hexadiene. 2,491,433. Wingfoot Corp.

Vinyl halide resin capable of resisting discoloration upon heating which comprises a polymer of the group consisting of polyvinyl halide and the copolymers of vinyl halide and another polymerizable mono-olefinic compound containing a nitrate selected from the group consisting of ammonium nitrate, methyl guanidine nitrate and urea nitrate. 2,491,443. Wingfoot Corp.

Vinyl halide resin capable of resisting discoloration upon heating which comprises a solid copolymer of a vinyl halide and an ester having the following structural formula ROOC—CH=CH—COOR, wherein R is an alkyl radical, containing sodium nitrate. 2,491,444. Wingfoot Corp.

Polyvinyl formal resin plasticized with a dialkoxy-ethyl ester of a phthalic acid from the group consisting of 3-nitro phthalic acid and 4-nitro phthalic acid in which the alkoxy groups contain less than 5 carbon atoms. 2,491,455. Monsanto Chemical Co.

Polyvinyl formal resin plasticized with a dialkyl ester of a phthalic acid from the group consisting of 3-nitro phthalic acid and 4-nitro phthalic acid in which the alkyl groups contain less than 5 carbon atoms. 2,491,456. Monsanto Chemical Corp.

Acrylonitrile-vinylpyridine copolymers. 2,491,471. E. I. du Pont de Nemours & Co.

Polymerization of vinylpyridines. 2,491,472. E. I. du Pont de Nemours & Co.

Making a synthetic resin by reacting unsaturated fatty oil, elemental sulfur, and a member selected from the class consisting of quinoline and pyridine, by heating to initiate an exothermic reaction. 2,491,851. Pio Caccia, assignor of ¼ to Michael Di Girolamo.

Polyamide composition comprising a hydroxy substituted diphenyl sulfone and a polyamide resin. 2,491,934. Monsanto Chemical Co.

Polyamide composition comprising orthosulfobenzimide and a polyamide resin. 2,491,935. Monsanto Chemical Co.

Polyamide composition comprising a mixture consisting of N-ethyl o,p-toluenesulfonamide and orthosulfobenzimide, and a polyamide resin. 2,491,936. Monsanto Chemical Co.

Copolymers of vinyl chloride-diethyl maleate. 2,492,086. Monsanto Chemical Co.

Copolymers of vinyl chloride and vinyl acetate. 2,492,087. Monsanto Chemical Co.

Copolymers of vinyl chloride and diethyl maleate. 2,492,088. Monsanto Chemical Co.

Copolymers of vinyl chloride and vinyl acetate. 2,492,089. Monsanto Chemical Co.

Preparation of solid elastic methylpolysiloxanes. 2,492,129. General Electric Co.

Rubber

Polymerizing a mono-olefin and diolefin to form a high molecular weight rubbery polymer by dividing a first stream of anhydrous alkyl halide into second and third streams of alkyl halide; saturating said second stream with water, contacting with a Friedel-Crafts catalyst to form a first solution of Friedel-Crafts catalyst in alkyl halide, admixing said first solution with said third stream to form a second solution of Friedel-Crafts cata-

lyst, forming a feed stream of mono-olefin and a diolefin contacting said feed stream with said second solution to cause polymerization of said hydrocarbons to a rubbery polymer and recovering said polymer. 2,488,736. Standard Oil Development Co.

Retarding deterioration of a rubber by incorporating an antimonyl polyhydric phenol containing orthodihydroxy grouping. 2,488,975. U. S. Rubber Co.

Uncured rubbery butadiene-styrene copolymer containing an N-(hydroxyphenyl)pyrole as a deterioration retarder. 2,489,000. U. S. Rubber Co.

In vulcanizing sulfur vulcanizable elastomers wherein sulfur is the vulcanizing agent together with a vulcanization accelerator, the step which comprises incorporating in the vulcanizable stock, a compound of the group consisting of the trichloromethyl aryl compounds of the benzene and naphthalene series which contain no further substituents than those which carry in the aryl ring a substituent of the group consisting of halogen, nitro and methoxy groups. 2,489,340. E. I. du Pont de Nemours & Co.

Accelerator of vulcanization comprising of a powdered arylthiazyldisulfide admixed with a light mineral oil and a soap selected from the group consisting of the zinc soap of the aliphatic fatty acids of 8-22 carbon atoms. 2,489,704 American Cyanamid Co.

Rubber-like product obtained by heating an omega-hydroxy saturated aliphatic car oxylic acid with a glycol acid ester of an alpha, beta-unsaturated dicarboxylic acid and curing the reaction product by heating in the presence of an organic peroxide catalyst. 2,489,711. American Cyanamid Co.

Rubber-like product obtained by heating a monoalkylolamine with a saturated aliphatic hydrocarbon dicarboxylic acid which does not form an anhydride upon heating, reacting the product so obtained with a glycol acid ester of an alpha, beta-unsaturated aliphatic hydrocarbon dicarboxylic acid. 2,490,001. American Cyanamid Co.

Rubber-like product obtained by heating at least one monoalkylolamine with an aliphatic saturated hydrocarbon dicarboxylic acid which does not form an anhydride upon heating, reacting the product with an alpha, beta-unsaturated aliphatic hydrocarbon dicarboxylic acid and curing in the presence of an organic peroxide catalyst. 2,490,002. American Cyanamid Co.

Vulcanizing a synthetic sulfur vulcanizable rubber-like copolymer of a butadiene-1,3 hydrocarbon and a mono vinyl compound by heating with the copolymer of an N-thio amine, containing at least two sulfur atoms but less than five attaching the nitrogen atoms of two secondary amine residues. 2,490,518. Monsanto Chemical Co.

Rubber composition comprising a coniugate diolefin polymer and a material of the group consisting of an unsubstituted rosin amine and a salt of an unsubstituted rosin amine and an organic acid. 2,491,913. Hercules Powder Co.

Specialties

2-nitro-2-methyl propyl stearate suitable for use as waterproofing agents. 2,488,650. Commercial Solvents Corp.

Anti-fogging composition consisting of a diester of sulfosuccinic acid with an alkyl-substituted hydroaromatic alcohol of 11-13 carbon atoms with hydrophilic colloid selected from the group consisting of water-soluble gums and starches and alkali-solubilized casein. 2,489,026. American Cyanamid Co.

Rocket propulsion method which comprises injecting a fuel comprising a volatile aliphatic hydrocarbon having a terpene hydrocarbon dissolved therein together with an oxidant comprising nitric acid containing a member of the group consisting of sulphuric acid and oleum. 2,489,051. American Cyanamid Co.

Chewing gum base incorporating zein, water, glycol ester of maleic modified rosin ester, and a plastieizer. 2,489,147. Boris N. Lougovoy.

Stable blue writing ink. 2,489,463. Parker Pen Co.

Red smoke producing composition consisting of lactose, potassium chlorate, and dyes. 2,489,549. John Vinton and Douglas M. MacMillan.

Low water loss cement containing pregelatinized starch. 2,489,793. Universal Atlas Cement Co.

Rust preventing composition consisting of mineral oil, an oil soluble petroleum metal sulfonate, and a copolymer of butadiene and diisobutylene. 2,490,264. Standard Oil Development Co.

Obtaining a hard wax fraction from crude sugar cane wax comprising heating crude sugar cane wax until the wax is melted, adding the molten wax to a fat solvent selected from the group consisting of acetone, methylethylketone, ethyl ether, heptane, hexane and pentane. 2,490,722. S. C. Johnson & Son, Inc.

Antirust agent containing liquid hydrocarbon, the reaction product obtained by reacting an alkenyl succinic acid anhydride with a primary amine. 2,490,744. Socony-Vacuum Oil Co., Inc.

Pipe joint compound consisting of aluminum silicate, sodium meta silicate, propylene glycol, sodium stearate, calcium stearate, and petroleum lubricating oil. 2,490,949. Joseph P. De Lorenzo.

Producing an adsorbent cleaning composition, which consists in incorporating a surface active agent in plastic fuller's earth. 2,491,051. Attapulgus Clay Co.

Flushing compositions composed of a catalytic reformed naphtha fraction in combination with said catalytic reformed naphtha fraction alkylated with an olefin of at least two carbon atoms. 2,491,120. Standard Oil Co.

Non-corrosive liquid consisting of a liquid selected from the class consisting of water and water-soluble alcohols and a corrosion inhibiting amount of the sodium salt of 2-ethyl-hexyl, 3-methyl-butyl orthophosphoric acid. 2,491,222. Gulf Oil Corp.

Coating material for admixture with water for coating a piece of blank metal stock and forming a permanent, self-adherent dry homogeneous lubricating and protecting film consisting of water-soluble high titre soap and borax. 23,184. Gilron Products Co.

Adhesive cement having a butadiene-acrylonitrile copolymer base. 2,491,477. Minnesota Mining & Mfg. Co.

Lubricant consisting of an oily mixture of linear methylpolysiloxanes. 2,491,843. General Electric Co.

Textiles

Improving the ironing properties of organic substitution derivative of cellulose textile materials by treating with an aqueous solution of boric acid, drying, and then subjecting to a heat treatment under pressure. 2,488,587. Celanese Corp. of America.

Improving the ironing and heat-resisting properties of textile materials having a basis of a nonthermoplastic textile material, which comprises applying a solution of boric acid, drying and then subjecting them to a heat treatment under pressure. 2,488,588. Celanese Corp. of America.

Treating normally non-water repellent material to impart water repellent properties by impregnating with a product resulting from the sequential steps of heating a material selected from the class consisting of amides of fatty acids, mixtures of fatty acids and nitriles of fatty acids and mixtures of fatty acids and amides of fatty acids, thereafter chlormethylating said product of the heating, and reacting with a tertiary amine; and subjecting the impregnated material to heat treatment. 2,489,473. Sun Chemical Corp.

Production of protein filaments. 2,489,519. Imperial Chemical Industries Ltd.

Impregnating fibrous materials with a copolymerizable composition containing an unsaturated alkyd resin in admixture with a styrene, said resin prepared by reacting a completely symmetrical glycol with fumaric acid. 2,489,985. American Cyanamid Co.

Water repellent composition for textiles consisting of: stearamide, methylated methylol melamine, alkali metal stearate, sodium isopropyl naphthalene sulfonate, ammonia and water. 2,491,249. American Cyanamid Co.

Stabilizing woven net fabrics composed of hard-finish nylon threads by impregnating with an aqueous solution of a water-soluble alkylated methylol melamine in an uncured condition, and subsequently heating. 2,491,454. American Cyanamid Co.

*Agricultural**

Preparing water-soluble polyphosphates containing 4 to 10 ethyloxy groups and 2 to 8 phosphorus atoms per molecule by reacting diethyl ether with phosphorus pentoxide. 2,492,153. Eastman Kodak Co.

Polychloro ether of hydroxytetrahydrodicyclopentadiene insecticides. 2,492,-266. Hercules Powder Co.

Spray residue removal composition comprising a hydrocarbon oil capable of acting as a solvent upon the fruit wax, an alkyl aryl sulfonate wetting agent, a fatty acid of the 18 carbon type having at least one unsaturated bond, and an alkaline agent combined with the fatty acid to form a soap. 2,493,460. Balab.

Methylenedioxyphenyl compound as insecticide, insect repellent, and pyrethrin synergist. 2,493,927. Boyce Thompson Institute for Plant Research, Inc.

Salts of aromatic dithiocarboxlic acids as fungicides. 2,494,355. U. S. Rubber Co.

As a new composition useful as a pest control agent risistant to water leaching; an oil soluble solution containing at least one water-insoluble metal salt of a mono-basic organic acid stabilized against water leaching by the metal salt of at least one substantially water-soluble quaternary ammonium compound. 2,494,941. Nuodex Products Co., Inc.

*Cellulose**

Preparing viscose solutions by reacting carbon disulfide with alkali cellulose, forming in the same vessel a slurry of the resulting cellulose xanthate in water, discharging the slurry except for a small residue into a separate dissolving vessel, then introducing in successive steps aqueous sodium hydroxide solutions and forming a slurry with the residue therein, discharging the resulting slurry into the dissolving vessel, agitating to form a viscose dispersion of the desired composition. 2,492,421. American Viscose Corp.

Adjusting the age of alkaline cellulose xanthates by incorporating β-methyl acrylamide. 2,492,428. American Viscose Corp.

Reacting cellulose with adipyl dichloride and lauroyl chloride in the presence of pyridine and toluene. 2,492,442. American Viscose Corp.

Reacting cellulose with at least one monobasic organic acid, and at least one polybasic organic acid, in the presence of at least one anhydride of a halogen-substituted monobasic organic acid, a catalyst, and a substance in which the reaction product is at least partially solvated during the reaction, and terminating the reaction when substantially a monobasic acid triester has been formed. 2,492,443. American Viscose Corp.

Cellulose ester of a stabilized rosin carbamic acid. 2,492,928. Hercules Powder Co.

Cellulose acetate film-forming solution composed of cellulose acetate dissolved in a solvent mixture composed of methylene chloride, an unsubstituted aliphatic monohydric alcohol of 1 to 2 carbon atoms and propylene chloride. 2,492,977. Eastman Kodak Co.

Cellulose acetate film-forming solution composed of cellulose acetate dissolved in a solvent mixture composed of methylene chloride, an unsubstituted aliphatic monohydric alcohol of 1 to 2 carbon atoms and ethylene chloride. 2,492,978. Eastman Kodak Co.

Automatically controlled recovery of heat and SO_2 gas from relief gases and waste liquor in the operation of a sulfite cellulose plant. 2,494,098. American Heat Reclaiming Corp.

Applying a liquid polymeric alkyl siloxane to a surface of a body formed from ethylcellulose containing cellulosic fibers as a filler and having exposed cellulosic fibers on said surface, to impart a lustrous and uniform appearance to said surface. 2,494,513. Dow Chemical Co.

*Ceramics**

Glass etching agent comprising hydrofluoric acid and carbon. 2,493,984. McKay Chemical Co., Inc.

Glass fibres which consist of SiO_2, at least one glass flux selected from the group consisting of alkali metal oxide and B_2O_3, and at least one additional glass-forming oxide selected from the class consisting of BeO, MgO, CaO, ZnO, SrO, CdO, BaO, Al_2O_3, TiO_2, ZrO_2 and ThO_2. 2,494,259. Corning Glass Works.

Ceramic batch comprising alumina, calcium oxide added as tricalcium penta-aluminate, titanium dioxide, and silica. 2,494,276. United Aircraft Corp. and Ethyl Corp.

Ceramic body and batch which contains alumina, tri-calcium penta-aluminate silica, and boric acid. 2,494,277. United Aircraft Corp. and Ethyl Corp.

Manufacture from barium and strontium titanates of a ceramic body having a high permittivity. 2,494,699. British Insulated Callender's Cables Ltd.

*Coatings**

Temporarily protecting ferrous metallic surfaces from rusting by applying a film of a composition consisting of air-blown petroleum asphalt, gilsonite petrolatum, and stoddard solvent. 2,492,848. Phillips Petroleum Co.

Coating composition comprising an oil-modified alkyd resin vehicle, aluminum flakes, and a β-dialkylaminoalkylmethacrylate polymer. 2,493,020. E. I. du Pont de Nemours & Co.

Synthetic drying composition consisting of tall oil esters of a high molecular weight resinous polymeric polyhydric alcohol. 2,493,486. Devoe & Raynolds Co., Inc.

Coating compositions for magnetic materials consisting of a mixture of a drying oil-modified phenolic resin and silica aerogel. 2,493,609. General Electric Co.

Production of protective coatings on aluminum and alloys thereof with an aqueous bath consisting of a sodium carbonate; sodium hydroxide;

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potassium dichromate; aluminum chloride, washing the treated article, subsequently subjecting the article to a second bath, consisting of chromic acid in aqueous solution. 2,493,934. Reynolds Metals Co.

Coating a metal object by applying a coating of an oil-free phenol-formaldehyde resin, baking to polymerize the resin, then applying a coating of formaldehyde-amine resin and then baking. 2,494,297. Heresite & Chemical Co.

Coating composition comprising an acetone-soluble, fusible, resinous interpolymer of monomers consisting of substituted styrene and a diallylic fumarate. 2,494,329. U. S. Rubber Co.

Coating composition of the class of paints and varnishes, including a glyceride type oil that hardens and dries by oxidation, and a drier, of the group consisting of dicyclopentadiene peroxide, dicyclopentadiene diperoxide and mixtures thereof. 2,494,418. Carnegie-Illinois Steel Corp.

Ski lacquer composition, comprising a wax, an alkaline earth metal salt of a dioctyl ester of sulfo-succinic acid, and a nitrocellulose composition. 2,494,531. United Aircraft Corp.

Fusible impregnating and coating composition which is resistant to the solvent action of hydrocarbons, which comprises a blend of solid, substantially saturated ester of a fatty acid having more than 10 carbon atoms per molecule and a monohydric alcohol. 2,494,559. Baker Castor Oil Co.

Paint mixture consisting of basic carbonate white lead pigment; soy bean oil that has been conjugated by treatment in the presence of nickel-carbon catalyst; paint drier; and calcium oxide. 2,494,565. U. S. A. as represented by the Secretary of Agriculture.

In coating articles with a wrinkle-textured film, preparing a mixture of polyvinyl butyral, butanol and water. 2,494,597. New Wrinkle, Inc.

Coating ferriferous and zinciferous metals by treating with acid aqueous solution, containing fluoride ion, dichromate ion, phosphate ion and hydrogen ion. 2,494,908. American Chemical Paint Co.

Coating copper, brass, terneplate, magnesium, zinciferous and ferriferous surfaces by treating with solution of fluoride, dichromate, arsenate and hydrogen ions. 2,494,909. American Chemical Paint Co.

Coating metal from the group consisting of aluminum and alloys thereof by subjecting the metal to the action of an aqueous solution containing fluoride ion, dichromate ion and phosphate ion. 2,494,910. American Chemical Paint Co.

Coating with organopolysiloxanes. 2,494,920. Corning Glass Works.

Detergents

Manufacture of soap from sperm oil. 2,492,940. Compania Industrial.

Detergent composition characterized by reduced tendency to form lime soap curd when used in hard water, comprising a ternary mixture of a water-soluble soap, a water-soluble salt of an organic sulfuric reaction product having pronounced detergent properties and having in its molecular structure a radical selected from the group consisting of sulfonic acid and sulfuric acid ester radicals, and an ester of allyl alcohol and a soap-forming carboxylic acid. 2,494,580. Procter & Gamble Co.

Finely divided free-flowing abrasive soap consisting of anhydrous sodium soap, corn meal, water-soluble crystalline potassium metaphosphate, alkali-metal tripolyphosphate, hydrated borax, and organic stabilizing agent to prevent rancidity of the soap. 2,494,827. Hall Labs., Inc.

Making surface active material, by reacting oleonitrile with sulfuric acid in the presence of an oxygen-containing aliphatic solvent. 2,495,105. Sun Chemical Corp.

*Dyes & Pigments**

Black organic coloring composition for use as coloring matter in hectograph carbon paper, comprising the water insoluble reaction products of Chrysodine with ate least two water-soluble basic dyes selected from the group consisting of the polyaryl-methanes, ketonimines, xanthenes, acridines, and thiazoles devoid of sulfo and carboxy groups, one of them being Crystal Violet. 2,492,163. E. I. du Pont de Nemours & Co.

Azo dyes. 2,492,907. General Aniline & Film Corp.

Producing a pigment by reacting a basic dye with a hydrous zirconia hydrogel. 2,492,959. National Lead Co.

P-nitro-o-methyl sulfonebenzene azo-N-β-cyanoethyl-N-hydroxy-alkylaniline dye compounds. 2,492,971. Eastman Kodak Co.

P-nitro-o-trifluoromethyl benzene-azo-N-β-cyanoethyl-N-hydroxyalkylaniline dye compounds. 2,494,972. Eastman Kodak Co.

In preparing a thioindigo coloring matter by reacting with a dehydrating and oxidizing mineral acid upon a phenyl-thioglycollic acid, the improvement which consists in the presence of a compound selected from the group consisting of organic mercaptans and disulfides. 2,493,072. E. I. du Pont de Nemours & Co.

Acid merocyanine dyes. 2,493,747. Eastman Kodak Co.

Merocyanine dyes. 2,493,748. Eastman Kodak Co.

Trisazo-dyestuffs. 2,493,975. Ciba Ltd.

Dimethine merocyanine dyes. 2,494,031. Eastman Kodak Co.

Styryl dyes. 2,494,032. Eastman Kodak Co.

Dyestuffs of the anthraquinone series. 2,494,240. Sandoz Ltd.

Azo-dyestuffs. 2,494,416. Ciba Ltd.

Making a pigment emulsion by dispersing a pigment with the aid of a dispersing agent comprising a non-convertible alkyd resin and a basic substance selected from the group which consists of ammonia and alkylolamines. 2,494,810. Geigy Co. Ltd.

Benzanthrone dicarboxylic acid vat dyestuffs. 2,494,811. Ciba Ltd.

Metalisable monoazo dyestuff of the formula A—CO—B—N=N—D where in A represents a member selected from the group consisting of o-hydroxy-carboxy radicals of the benzene and naphthalene series, B represents a member selected from the group consisting of m- and p-phenylene radicals, and D represents a 5-pyrazolone radical bound in the 4-position of the pyrazolone nucleus. 2,494,969. J. R. Geigy A.-G.

Anthraquinone thioxanthone dicarbazole dyestuffs. 2,495,014. General Aniline & Film Corp.

Heterocyclic fluorescent coloring materials. 2,495,202. Joseph L. Switzer and Robert C. Switzer.

*Inorganic**

Forming alumina-containing gel beads. 2,492,167. Socony-Vacuum Oil Co.

Exfoliating and bleaching vermiculite comprising immersing the vermiculite in a bath consisting of a nitro acid solution, and phosphoric acid, draining, then immersing the vermiculite in a solution of citric acid. 2,492,208. Joseph B. Barnes.

Continuous purification and concentration of spent hot sulphuric acid iron pickling liquors with removal of copperas therefrom. 2,492,333. Norman Swindin.

Gelling viscous sol particles in aqueous ammonia. 2,492,808. Socony-Vacuum Oil Co., Inc.

Increasing filterability of magnesium hydroxide by carbonating a small amount only of the sludge, thereby increasing the filterability. 2,493,051. Permanente Metals Corp.

Preparing a basic salt composition from a solution containing a salt of the class consisting of the sulfates and chlorides of copper, zinc and aluminum, adding sufficient aqueous ammonia to render said solution alkaline and contacting the resulting slurry with cuprous oxide and an oxygen containing gas. 2,493,262. Harshaw Chemical Co.

Preparing a hydrated ferrous chloride in dry flake form, consisting of the steps of preparing an aqueous solution consisting of ferrous chloride weight, disposing said solution as a film on a heated surface and evaporating to leave a dry hydrated ferrous chloride, and mechanically removing said hydrated ferrous chloride from said surface as dry flakes. 2,493,629. Henry L. Crowley & Co., Inc.

Built-up mica product comprising mica splittings bound together by the water-insoluble product of the fusion of a water-soluble reaction product of a water-soluble alkali metal silicate and a water-soluble alkali metal aluminate, the alkali metal being selected from the group consisting of sodium and potassium. 2,493,693. Continental-Diamond Fibre Co.

Built-up mica product comprising mica splittings bound together by the water-insoluble product of the fusion of a water-soluble reaction product of a water-soluble alkali metal silicate and of a water-soluble alkali metal aluminate, the alkali metal being selected from the group consisting of sodium and potassium, and of a compound selected from the group consisting of borax glass and boric acid. 2,493,694. Continental-Diamond Fibre Co.

Iron pentacarbonyl blended with an acidified hydrocarbon-soluble neutral alkylamide of a saturated aliphatic hydroxy polycarboxlic acid in which the alkyl radical of each of the amide groups contains at least 4 carbon atoms, the alkylamide being acidified with no more than an equal volume of a hydrocarbon-soluble carboxylic acid. 2,493,712. General Aniline & Film Corp.

Iron pentacarbonyl blended with an acidified hydrocarbon-soluble neutral alkylester of a saturated aliphatic hydroxy polycarboxlic acid in which the hydroxy portion is free and the alkyl radical of each of the ester groups contains at least 4 carbon atoms, the alkylester being acidified with no more than an equal volume of a hydrocarbon-soluble carboxylic acid. 2,493,713 General Aniline & Film Corp.

Iron pentacarbonyl blended with an acidified hydrocarbon-soluble neutral alkylester-alkylamide of a saturated aliphatic hydroxy polycarboxylic acid in which the hydroxy portion is free and the alkyl radical of each of the ester and amide groups in each instance contains at least 4 carbon atoms, the alkylester-alkylamide being acidified with no more than an equal volume of a hydrocarbon-soluble carboxylic acid. 2,493,714. General Aniline & Film Corp.

Iron pentacarbonyl blended with a hydrocarbon-soluble partial alkylamide of a saturated aliphatic hydroxy polycarboxylic acid wherein the alkyl radical of the amide group in each instance contains at least 4 carbon atoms, the amount of the alkylamide being sufficient to increase the stability to light of the iron pentacarbonyl. 2,493,715. General Aniline & Film Corp.

Iron pentacarbonyl blended with a hydrocarbon soluble partial alkyl ester-alkyl amide of a saturated aliphatic hydroxy polycarboxylic acid of at least three carboxyl groups, in which the hydroxy portion is free and the alkyl radical of the ester and amide groups in each instance contains at least 4 carbon atoms, the amount of the alkyl ester-alkyl amide being sufficient to increase the stability to light of the iron pentacarbonyl. 2,493,716. General Aniline & Film Corp.

Iron pentacarbonyl blended with a minor proportion of a hydrocarbon-soluble partial alkylester of a saturated aliphatic hydroxy polycarboxylic acid in which the hydroxy portion is free and the alkyl radical of the ester group in each instance contains at least 4 carbon atoms, the amount of the alkylester being sufficient to increase the stability to light of the iron pentacarbonyl. 2,493,717. General Aniline & Film Corp.

Precipitating a fast-settling sludge of magnesium hydroxide from seawater by adding dry, calcined dolomite. 2,493,752. Permanente Metals Corp.

Production of light weight aggregate by the thermal bloating of clay, by mixing the clay with sulfur or iron pyrites and thermally bloating said blend. 2,493,763. Theron A. Klinefelter.

Producing calcium chromate by reacting sodium chloride and ammonium bicarbonate to produce sodium bicarbonate and ammonium chloride, regenerating the ammonium bicarbonate by reacting the ammonium chloride with calcium hydroxide with the production of ammonia and calcium chloride and reacting the ammonia thus produced with carbon dioxide, producing calcium chromate and simultaneously regenerating the sodium chloride by reacting chromic oxide with the sodium oxide of the sodium bicarbonate under oxidizing conditions to form sodium chromate and reacting the sodium chromate with the calcium chloride produced, separating the calcium chromate, and utilizing the regenerated sodium chloride and the regenerated ammonium bicarbonate to regenerate sodium bicarbonate for production of additional calcium chromate. 4,293,789. Marvin J. Udy.

Preparing a polyphosphate glass having calcium sequestering and viscosity reducing properties, by heating a mixture of a phosphoric compound and an alkali metal compound selected from the group consisting of the alkali metal hydroxide and the carbonate and phosphate salts thereof. 2,493,809. Texaco Development Corp.

Preparing a silica-alumina catalyst by depositing on activated alumina an organic compound capable of yielding silica when subjected to heat. 2,493,896. Gulf Research & Development Co.

Making phosphoric acid from calcium phosphate by reacting the calcium phosphate material in a tower by introducing into the tower and passing upwardly through the calcium phosphate a gaseous reagent from the group consisting of hydrogen chloride and hydrogen fluoride to release the phosphoric acid and to form a halogen salt of calcium, and passing downwardly through the calcium phosphate material and countercurrent to the reagent a volatile organic solvent which selectively dissolves the phosphoric acid in situ. 2,493,915. Kansas City Testing Laboratory.

Dicalcium mono-silicate cementitious material and cryolite. 2,493,930. Joseph P. Ryan.

Producing calcium chromate by reacting sodium nitrate and ammonium bicarbonate to produce sodium bicarbonate and ammonium nitrate, regenerating the ammonium bicarbonate by reacting the ammonium nitrate with calcium hydroxide with the production of ammonia and calcium nitrate and reacting the ammonia thus produced with carbon dioxide in an aqueous liquid, producing calcium chromate and regenerating the sodium nitrate by reacting chromic oxide with the sodium oxide of the sodium bicarbonate under oxidizing conditions to form sodium chromate and reacting the sodium chromate with calcium nitrate produced in regenerating the ammonium bicarbonate, separating the calcium chromate, and utilizing the regenerated sodium nitrate and the regenerated ammonium bicarbonate to regenerate sodium bicarbonate. 2,494,215. Marvin J. Udy.

Preparing a rutile seeding agent, by treating an alkali metal titanate with a monobasic acid to convert the alkali metal content to the salt of the monobasic acid and to theoretically convert about 20% to 50% of the titanium content to the salt of the monobasic acid, and boiling the resultant mixture whereby the titanium content is substantially converted to a rutile conversion seed. 2,494,492. American Cyanamid Co.

* From Vol. 629, No. 4; Vol. 630, Nos. 1, 2, 3

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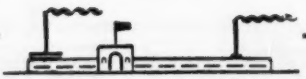

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(Continued from page 580)

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To assure high insulation and low electrical leakage, electrode lead-wires are permanently attached . . . molded into the plastic electrode head. Thus, the electrode maintains its fine accuracy even under conditions of high atmospheric humidity.

Electrodes are color-coded for three ranges of solution temperature: 0 to 30° C; 20 to 60° C; and 50 to 90° C.

• An air-conditioned **time delay valve** is available from Ross Operating Valve Co., 120 E. Golden Gate Ave., Detroit 3, Mich. Unlike the old spring-pressure controlled valves, this model operates by volume measurement of air. The use of regulated air assures constant repetition of time sequence.

The new unit is available for all Ross in-line operating bodies which range from ¼" to 1¼" in size, and are furnished in straightway, 3-way, normally open and normally closed models.

• Farris Engineering Corp., 504 Commercial Ave., Palisades Park, N. J., has added a new forged bar stock valve to its line of **safety-relief valves,** Type 2745. It is supplied in stainless steel, steel and brass, with a choice of orifice sizes, for pressures up to 10,000 psi. and has a coefficient of discharge equal to that of a nozzle discharging direct to atmosphere.

Features include a new lower blow down ring, self-aligning flat disc and long spring for close adjustment. The nozzle, perfectly aligned for concentricity, is secured by a nozzle retaining nut. Full capacity is obtained through high disc lift, developed by utilizing the full force of the nozzle flow.

• New Model P-2 **electronic potentiometer** of Southwestern Industrial Electronic Co., 2831 Post Oak Rd., Houston 19, Texas makes precise potential measurements on high impedance electrochemical cells or electronic tubes and circuits. The instrument is suitable for the measurement of potentials from 0-3 volts in three ranges. The instrument is suitable for use with glass electrodes. A built-in standard cell, combined with a 0.1% potentiometer and dual range dial, provides an accuracy of plus or minus (one millivolt plus 0.1%). The instrument is well suited for precise pH measurements, having a comparative accuracy of 0.05 pH units.

• The control setting on the new H-B quick-set **thermo-regulator,** available from H-B Instruments Co., Dept. T-6, 2633 Trenton Ave., Philadelphia 25, Pa., can be varied over a wide range in a matter of seconds. Once set within 10° F. of the control temperature, adjustments of several degrees down to 0.01° are made by merely turning a ring knob. This self contained regulator fits into the medium to be controlled and, through an electronic relay, can handle up to 30 amperes at 110 volts AC.

One model covers a range from approximately +30-600° F. Another covers a range from minus 38° F. to about 50° F. Overall length is 14".

• A rigid, asphalt-enclosed, cold storage **floor insulation board,** Fiberglas AE-F, has been added to its line of low temperature insulation products by Owens-Corning Fiberglas Corp., 16 E. 56th St., New York 22, N.Y. The new board differs from the company's asphalt-enclosed boards for low temperature wall and ceiling insulation in that the component glass fibers are parallel to the action of the load, providing increased compression resistance. The new product is for use under the wearing slabs of cold storage rooms. Under floor loadings up to 1000 pounds per square foot it will compress less than one per cent.

• The new micro-magnetic separator of Erie Mfg. Co., Erie, Pa. uses permanent (non-electric) magnetic separator to remove small particles of iron from fine, cohesive dry powders. These particles range in size from 16 mesh down to tiny 400 mesh.

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FROM WHERE WE SIT

by "DOC"

WE NEVER SUSPECTED that a strong streak of whimsy ran through those dignified, knowledgeable Oak Ridge scientists until we discovered that a couple of their radiation instruments were named "Cutie Pie" and "Walkie Poppy."

LET US TACTFULLY suggest to the Stauford Research Institute to practice what it preaches in a recent brochure extolling its literature searching facilities. It is our considered opinion that the author of Ecclesiastes (xii: 12) far antedates Franklin P. Adams ("F.P.A.") to whom the quotation, "Of making many books there is no end . . .," is credited.

"According to the psychologist the new operator on No. 2 kettle should have your job."

A RECENT REPORT in the chemical press told us that E. G. Ball, of Harvard, gave a paper on "Bio-Logical Oxidations." It comes as no surprise to us that they're putting nature on a logical basis up Boston way.

THE DEPARTMENT OF JUSTICE says that Du Pont, General Motors and U. S. Rubber have eliminated competition among themselves by dividing fields of manufacture. Guess we'd all better watch out. The day may come when the only way to make sure of keeping out of jail will be to get into everybody else's backyard.

FELLOW up Massachusetts way is busy as a beaver getting out propaganda against "chemicals" in food—especially if they come from petroleum sources. Guess we're just dopes, because we've always thought that nicotinic acid synthesized from pyridine is exactly the same as nicotinic acid in calf's liver and pork roast.

Straight from the notebook of a medieval metaphysician and alchemist, it would seem to us, comes this lovely example of *non sequitur:* "I believe that since we live on top of the earth, foods, etc., from the top of the earth, or nearer the top, are best for the human body. I believe that foods and products from down deep in the earth are detrimental to the human body."

"Man," continues this propagandist, "has never yet improved on nature, and never will."

We need only point to the whole chemical industry, the steel industry, the auto industry, and a host of others to find easy refutation of that piece of nonsense. Nylon beats silk for sheathing feminine nether limbs, and a 1950 Buick beats walking.

We would go even further and say that civilization is unnatural—except for ants and bees. Our instincts tell us to club our neighbor over the head and steal his fatted calf. Shoes are unnatural, concrete sidewalks are unnatural, Martini cocktails are unnatural.

We're not going to give up juicy broiled tenderloin steak for synthetic rations—not for all the oil in Venezuela—but neither are we going to insist that we, unnatural man that we are, eat nothing altered from its pristine innocency by the working of human intelligence.

A BROOKLYNITE writes that he would "appreciate some information concerning the history of the pituitary gland."

Whose?

OUR EGO, which has been known to expand on occasion, particularly when an avid, affable reader tells us he wouldn't miss an issue. But it was punctured flat as a flying disc by a postcard received recently asking for a list of the 25 best chemicals of 1949 to make a buck on. "Seems that everything we want to know," the card continues, "is impossible to find out about. . . . All Trade Magazines seem to know nothing much about the things they specialize in. . . . Nobody knows anything."

A CHEMIST FRIEND of ours who gets confused by all the zeroes *before* the decimal point in the Government's budget and *after* the decimal point in his own has a wonderful idea, borrowed, he'll have to admit, from scientific terminology: Why not have megabucks (millions of dollars) and microbucks (millionths of dollars)?

"I told my boy about you, Dr. Smithers, and now he wants to study chemistry, too."

ACCORDING TO *The Chemical Age,* British bureaucrats have trouble with chemical terminology—as shown by an official notice headed "The Carriage of Any of the Following Articles by Air Is Forbidden": "No acids may be carried except citric and tartaric (alginic acid is presumably ruled out). Matches ('Lucifer percussion of all kinds') caters, supposedly, for those getting on in years who may respond to these old-fashioned terms. The hyphen in nitro-glycerine may be there in the interests of clarity, but 'nitro of lime calcium' is fabulous. The company will not carry saltpetre or arrack, and is probably particularly down on those wishing to despatch meal worms by plane."

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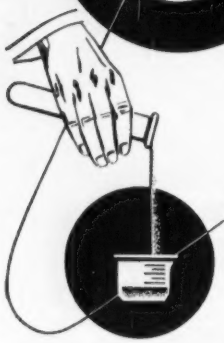

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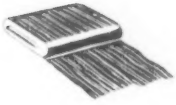

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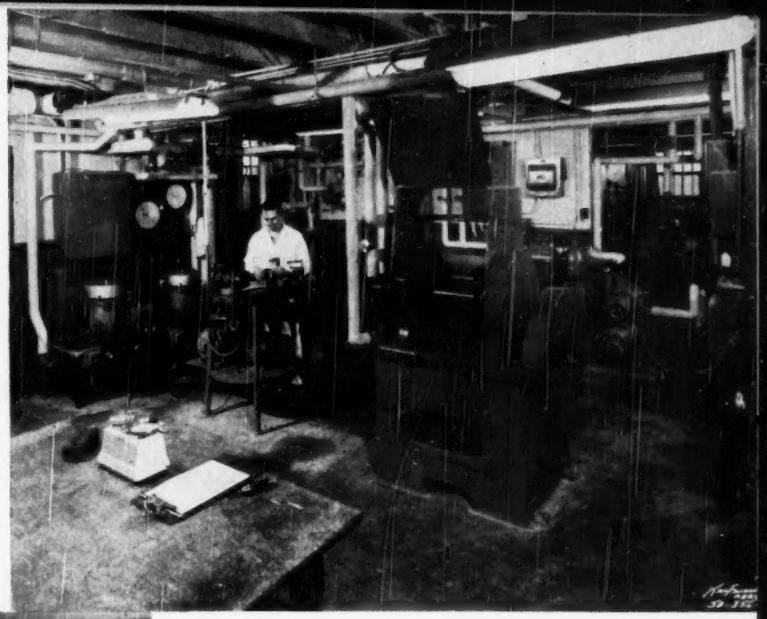
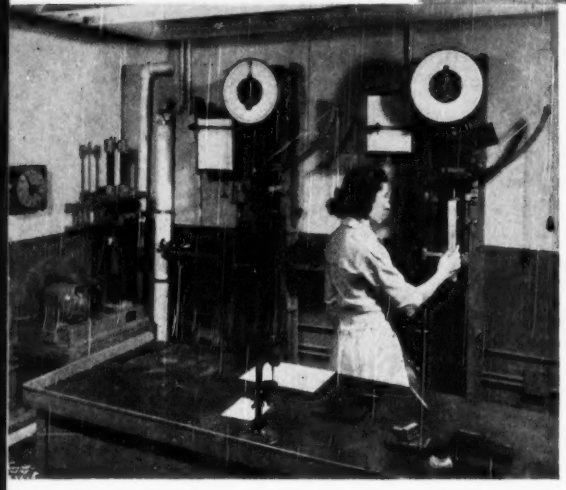


Part of Witco-Continental's new rubber laboratory showing mill and other specialized testing equipment.

One section of constant controlled temperature-humidity testing room showing Scott testers and flexing machine.



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